the OIL AND GAS JOURNAL
PUBLISHED WEEKLY DECEMBER 25, 1961

World-wide Oil

Special section begins p.103

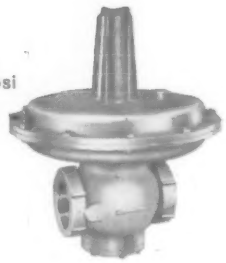
The bright spots in oil are abroad 81

Sun goes all out for eight grades 88

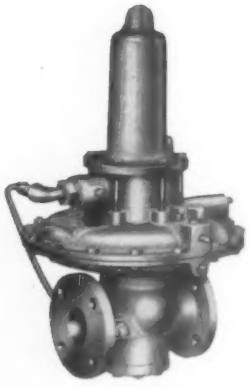
Moonie 1 brightens hopes in Australia 99

Philippines attract new exploration attention 212

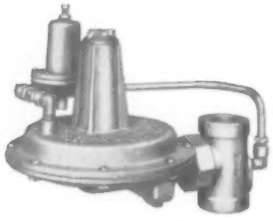
No. "120"
Low Pressure Regulator
Maximum Inlet Pressure—10 psi
Lbs. to inches
and lbs. to lbs. reduction
Bulletin 1044



NO. "080"
Instrument Regulator
Maximum Inlet Pressure—250 psi
Lbs. to lbs. reduction
Bulletin 1111



"No. 1001"
General Purpose Regulator
High Pressure Type—up to 250 psi inlet
Standard Type—up to 125 psi inlet
Lbs. to lbs. and lbs. to inches reduction
Bulletin 1059



No. "173"
Pilot Loaded Service Regulator
Maximum Inlet Pressure—100 psi
Lbs. to lbs. reduction
Bulletin 1113

No. "141"
High Pressure Field Regulator
Maximum Inlet Pressure—1500 psi
Lbs. to lbs. reduction
Bulletin 1024

ROCKWELL GAS PRESSURE REGULATORS

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- INSTRUMENTS

If you have a problem in gas pressure reduction or control we invite your inquiries. We make specialized types of regulators to tame pressures all the way from the well head right up to the burner. Designs and materials differ according to the service, but all Rockwell regulators have one thing in common—top quality, the result of fine engineering, precision manufacturing and careful tests.

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another fine product by
ROCKWELL

OIL AND GAS JOURNAL
Vol. 59, No. 52

CONTENTS December 25, 1961

The week's news

General interest:
Eastern Hemisphere is still glamorous half of oil world 81
Gas producers object to FPC's "pipeline quality" proposal 83
API figures sum up 1961: it was better, but not much 84
Demand will rise in 1962, Bureau of Mines predicts 85
LPG sales will set another record this year 86
Midstream refueling cuts barging costs 90
Higher crude prices, lower pipeline tariff set for Swanson River 91
Ohio Oil plans change of corporate name 91
Hess enterprises may be set for greatest growth period 92
Opposition growing to California Commission's gas-price plan 96
Industry briefs 98

Drilling-production:
Humble is fencing in wild Galveston Bay gas well 85
Attempt to raise Canadian rig wages meets with little success 93
Texas rig-move charges are in for a big boost 94
Oklahoma independents seek local enforcement of oil regulations 97

Marketing:
Sun is going all out for eight-grade marketing 88
Gulftane's move to New York, Chicago may force new pricing pattern 88
Texas' spot market will be busy on 9-day producing allowable 98

Processing:
OCAW delays signing contract at Gulf's Port Arthur refinery 85
New Canadian refinery goes on stream 89
Atlantic's one-man gas plant processes 60,000 M.c.f.d. 95

Foreign news:
Moonie 1 brightens Australia's hopes for oil 99
ENI may build 190-mile Italian gas line 101
Italy's Gela field will begin full production soon 102
More wildcats planned in Spanish Sahara 102

Exploration:
Highlights of the exploration world in '61 211
Growing population and economy underline Philippines need for oil 212
November well completions 224

Regular features

Advertisers 247
Calendar 69
Classified advertising 244
Drilling contractors 208
Drilling statistics 239
Editorial 79
Equipment men 201
Exploration 211
Foreign news 99
Foreman's page 178
Journally speaking 77
New equipment 193
Personals 235
Pipeline construction 183
Price statistics 243
Process costimating 168
Processing notes 176
Production statistics 241
Refining statistics 242
Statistical summary 239
The Journal said 77
They say 66
Trade literature 198
Watching Washington 87

Technology section on next page →

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WORLD-WIDE OIL REPORT

This year-end roundup brings the reader up to date on oil activity outside the United States and Canada. Principal activity is summarized country by country both in text and in tabular form. Production tables include field names and their discovery dates, depth, number of flowing and pumping wells, and the gravity of the oil. Refining tables include company and refinery location, crude capacity, and a processing breakdown. Also included are three maps—the Persian Gulf area, North Africa, and Argentina. The maps show oil and gas fields, refineries, oil pipelines, and projected pipelines.

Journal Survey **104**

Leading off the world-wide oil report is a comprehensive table covering oil operations around the globe. This recap table condenses total figures for drilling, production, refining, and reserves for each nation.

COUNTRY-BY-COUNTRY INDEX

MIDDLE EAST

Bahrain **106**
Iran **106**
Iraq **108**
Israel **108**
Kuwait **109**
Neutral Zone **110**
Qatar **111**
Saudi Arabia **111**
Syria, Lebanon, and Jordan **112**
Southern Arabia **112**
Turkey **113**

AFRICA

Algeria **113**
East Africa **115**
Egypt **115**
Libya **116**
Morocco **117**
Nigeria and West Africa **119**
South Africa **119**
Spanish Sahara **119**
Tunisia **119**

ASIA-PACIFIC

Australia **134**
British Borneo **135**
Burma **135**
Formosa **135**
India **136**
Indonesia **137**
Japan **139**
Netherlands New Guinea **140**
Pakistan **141**
Philippines **141**
Singapore **141**
Malaya **141**

EUROPE

Austria **142**
Belgium **143**
France **144**
Greece **145**
Italy **145**
Netherlands **146**
Spain and Portugal **147**
Switzerland **148**
Russia and Satellites ... **148**
Red China **149**
Scandinavia **149**
United Kingdom **149**
Ireland **151**
West Germany **151**
Yugoslavia **154**

WESTERN HEMISPHERE

Argentina **121**
Bolivia **122**
Brazil **123**
Chile **123**
Colombia **124**
Cuba **125**
Central America **126**
Barbados **126**
Netherlands West Indies **126**
Puerto Rico **127**
Ecuador **127**
Mexico **127**
Peru **129**
Trinidad **130**
Uruguay **131**
Venezuela **131**

Technology

Figuring optimum power needs **157**
By Paul Pancio, Jr.

Process Costimating No. 106 ..... **168**

Leaded gasoline poses no threat to public health **171**

Processing notes **176**
Thermal pollution of water supply looms as major industrial problem—Union Oil adopts stainless piping—New cat reformer improves Ashlands operating flexibility—Signal's cat cracker gets the silencer treatment.

Foreman's page—Distillation, Part 4 ..... **178**

Mr. Arthur gets "jugged" **181**
By Ed McGhee

Pipeline construction report **183**

THE OIL AND GAS JOURNAL **Newsletter**

December 25, 1961

Significant this week

It looks as if next year will be better than the one just ending.

Bureau of Mines predicts 3% increase in domestic demand, more than double this year's increase over 1960. That will make 1962 the first year with a domestic demand topping 10 million barrels daily (p. 85).

Although U. S. showing this year was none too good, API reports most phases of industry made slight gains (p. 84).

This year saw a curtailment in growth rate of LPG sales. But they are still running 3.7% ahead of last year, and the outlook is for continued good growth (p. 86).

There are signs in other places that next year should be brighter.

A special Newsletter sampling shows:

—Chemical industry expects total sales of about $31 billion next year, a 6% increase over 1961.

—Asphalt manufacturers look for 7% increase in use of bituminous concrete for paving.

—Rubber industry foresees 7.5% boost in consumption. Forecast by Rubber Manufacturers Association says synthetic-rubber consumption will reach 1,185,000 long tons, compared with 1,076,000 this year, and will account for more than 73% of total supply.

—Steel predictions for 1962 range from an output of 105 to 115 million tons, depending in part on results of labor negotiations next spring. This year's production will total about 97 million tons. Incidentally, oil, gas, and powdered coal are gaining as supplementary fuels for blast furnaces.

Free world's over-all outlook for next year is good, too. Statistics tend to back up this forecast. As 1961 draws to a close:

—Reserves are up about 3%, with new North African fields providing most of increase.

—Production is up, mainly because North African fields are moving from exploratory stage into actual production.

—Refining capacity has climbed 6.3%.

Oversupply will assure keen competition, but demand abroad is expected to continue its steady climb (p. 81).

Other highlights of the week:

Australia finally has a commercial oil well in Union Oil of California's Moonie 1. Wildcat in Great Artesian basin of Queensland tested 1,765 bbl. daily, and Union hopes to follow up with confirmation test by middle of January (p. 99).

Other wildcat news is being made in Spanish Sahara, where Tidewater Oil has spudded a well. At least four other operators intend to spud their first wildcats in Spanish Sahara before first part of April (p. 102).

Fight over new and higher intrastate rates for trucking oil-field equipment in Texas may not be over, although Texas Railroad Commission has okayed boost. It's expected that American Association of Oilwell Drilling Contractors and other groups will seek rehearing before commission. If they lose, court action probably will follow (p. 94).

California may see more hearings, too, on the issue of wellhead-gas pricing.

In two rounds of hearings recently, state's Public Utilities Commission failed to attract much support for its bid to control prices. Door has been left open for more hearings, but no date has been set (p. 96).

News in the making

Here's proof that contractors have plenty to be alarmed about in current rig-labor shortage:

Need for crewmen is so acute in Texas Panhandle that some rigs can't even be put to work. Situation is so bad that:

—Contractors are sticking men-wanted posters in windows of cafes and grocery stores, calling for help in newspaper ads, importing crewmen from as far away as Central Oklahoma.

—Pirating is taking place. Some victimized rigs don't have enough men left to make a round trip, and are just circulating on bottom while efforts are made to get replacements.

—Several contractors with available rigs have been forced to turn down chances to bid on new projects.

Most critical spot: Spearman-Perryton-Hansford area.

All this confirms recent contractor warnings that their labor problem is grave, and that any major upturn in drilling activity is going to drive the point home.

One of world's biggest unitized floods—SACROC in West Texas' Kelly-Snyder field—may switch to conventional single-operator setup as means of cutting costs.

SACROC Advisory Committee has recommended such action. Standard Oil of Texas would serve as sole operator.

Unit is now split into three segments. They're operated separately by Stanotex, Mobil, and Sun Oil.

Any change must be okayed by at least 90% of working-interest owners. As they number more than 300, this would probably take 3 to 6 months.

Want an eye-opening example of how important payroll trimming can be to company profits?

Pure Oil says it's making $25-million annual saving as result of belt-tightening program.

Several oil pipelines are considering a new type of control panel.

Said to be highly flexible, panel is tiny compared with conventional panels and costs much less. It gives information in analog form.

And on the subject of new devices:

Optimistic report comes from researchers working on fuel cell that would use a hydrocarbon.

They say "excellent progress" is being made in program, a joint operation of Pure Oil and Gould-National Batteries.

Look for octanes to start trending upward again in a year or so.

Two things point to moderate resumption of octane race:

—Public seems more interested in performance and power.

—Phosphorous compounds, TML, and other additives appear to be able to handle unusual knock problems encountered at higher compression ratios.

You refiners will also be interested in this:

Ontario refinery is planned in next few years by Canadian Petrofina, which operates 30,000-bbl.-daily plant in Montreal.

New refinery is expected to be completed in 1965.

Meanwhile, Petrofina is supplying most of its Ontario markets through exchanges with Ontario refiners.

Keep an eye on oil doings in Libya and Turkey.

Oil men in Libya are exulting over BP-Bunker Hunt find on Block 65. They're calling it discovery of the year.

Completely new oil province has been opened by 3,910-bbl.-daily well. It's on what geologists call Western Desert platform.

Topnotch discovery is Libya's easternmost well (OGJ, Dec. 11, p. 63), and is flowing from sandstone pay. Most other Libyan production, including Zelten and Block 59 fields to northwest, is from limestone.

There's optimistic oil talk in Turkey, too.

TPAO, the government oil company, thinks reserves picture is pleasing now and will grow even brighter. And results of drilling are causing other companies operating there to re-evaluate their ideas on Turkey's potential.

Shell and Mobil have producing wells; Amoseas has shut-in, 11°-gravity well. Recent drilling at Shell 6 Koyakoy was structurally highest yet in that area, and company is starting new wildcat east of the field. Mobil has plans for deep test.

Market memo

Dec. 25, 1961

Petroleum wholesale markets continue brighter. They're slowly inching nearer normal.

Here's the rundown:

Heating oils—price of No. 2 is going **up one-half cent in the Mid-Continent** to 9.5 cents per gallon. Demand is brisk due to frigid weather. Already some tightness is reported in supply over the Midlands and along the Mississippi River . . . Expect a **one-fourth-cent advance for No. 2 on the Gulf Coast,** if prolonged cold visits the East. Prices are firm on the gulf now at 9 cents with two cargoes moved last week to clean up the spot market . . . Drag on big movement from the gulf has been discounts on the 10.25-cent New York Harbor barge price. Some weakness also cropped up last week in Baltimore.

Gasoline—Gulf Coast prices are unchanged at 10.75 to 11.25 cents, but supply is in as good shape as at any time since Suez. In the **Mid-Continent,** the new 11.50-cent price for regular along the Great Lakes pipeline is suffering some discounting but gives the appearance of holding . . . **Retail gasoline markets** generally look better—at least less volatile. Prices are stronger in New England, Pennsylvania, Virginia but weaker in chronic price-war areas of New York. Other pockets of trouble are in New Orleans, San Antonio, Denver, Phoenix.

Crude—The important Texas market is considered tight in spite of the slight boost in January allowables. Companies with surplus crude on hand are finding buyers.

Service-station site selection has been reduced to an IBM operation by Pure Oil.

Economic factors contributing to a successful location have been collected over the years, put into a formula, and programed on the computer.

The **technique is showing amazing accuracy** in giving its blessing to specific locations. It fits in admirably with the company's program of "making big ones out of little ones"—eliminating marginal and unprofitable outlets and replacing with large service centers.

Shell's credit-card campaign is going over big—more than 1,100,000 new holders have been added in 9 months, exceeding the full year's goal of a million. **Expectations:** More than 1,500,0O0 for 1961. Solicitations were made through employes, dealers, jobbers, and other channels.

Speaking of credit cards, **another sponsor is making overtures** to enter the broad oil marketing field. Representatives of National Credit Service, a division of International Credit Corp. of California, have distributed literature explaining NCS credit plan to some oil credit officials.

Marketing notes: Ohio Oil's stockholders will vote in May on proposal changing corporation's name to Marathon Oil Co. for closer identity with product brand name . . . **Tidewater** has bought Fred R. Drake, Inc., Auburn, N. Y., distributor with 19 stations, more than 75 dealers and other accounts . . . **Tidewater** also is expanding and modernizing East Providence, R. I., terminal to serve enlarged area throughout Rhode Island and parts of Connecticut and Massachusetts. New plant will be supplied by tanker rather than barges . . . **First deep-water cargo terminal** adjacent to big Westchester market is being built at Hastings-on-Hudson, N. Y., by Tappan Tanker Terminal, Inc. It will have a 575,000-bbl. capacity.

Good Wells Make Good News

Recent Acid Treatments That Solved Special Production Problems

December 25, 1961

Here are four recent treatments that show how Dowell uses job-tailored materials and engineered treatment planning to help operators solve production problems.

- **Midland County, West Texas** (New Gas Well) This well is completed into the Azalea Devonian through perforations from 11,321 to 11,340 feet. Dowell treated the well using a spearhead of 1000 gallons regular acid, then 70,000 gallons acid-oil-emulsion type Retarded Acid. Injection was down casing at 39 bpm at 5000 psi. 5000 gallons brine with inhibitor added was used to load and flush. *After treatment, well tested 5600 mcfd plus 1050 barrels of 54.5° distillate.*

- **Washakie County, Wyoming** (New Oil Well) This well is completed into the Phosphoria through perforations from 5195 to 5223 feet. Dowell acidized using 3000 gallons Retarded Acid followed by 2000 gallons regular acid. Both batches of acid contained a demulsifier. Injection was down annulus at about 6.2 bpm. *60 days after treatment, well was producing 176 bopd—considered exceptionally good for wells in this area.*

- **Carnes County, South Texas** (Old Oil Well) Pay is the Edwards lime at about 13,600 feet. Bottom-hole temperature is above 300° F. Dowell acidized using 10,000 gallons of a special high-temperature Retarded Acid. Injection was down two-inch tubing, four bpm at 6000 psi. Before treatment, production was 20 bopd. *After acidizing, production stabilized at 130 bopd.*

- **Morton County, Kansas** (Old Oil Well) This Morrow well came in natural at 60 bopd upon completion, but had to be killed in order to run tubing. When well was returned to production, it failed to make its natural flow. Production had dropped to 20 bopd when Dowell was called. Dowell caught samples of produced fluid and ran a series of laboratory tests to determine cause of low production. A clean-up treatment using 500 gallons regular acid with a Dowell demulsifying agent added was recommended and performed. *Well cleaned up easily and tested 120 bopd.*

Let a Dowell engineer help you select a treatment designed to solve your production problems profitably. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma.

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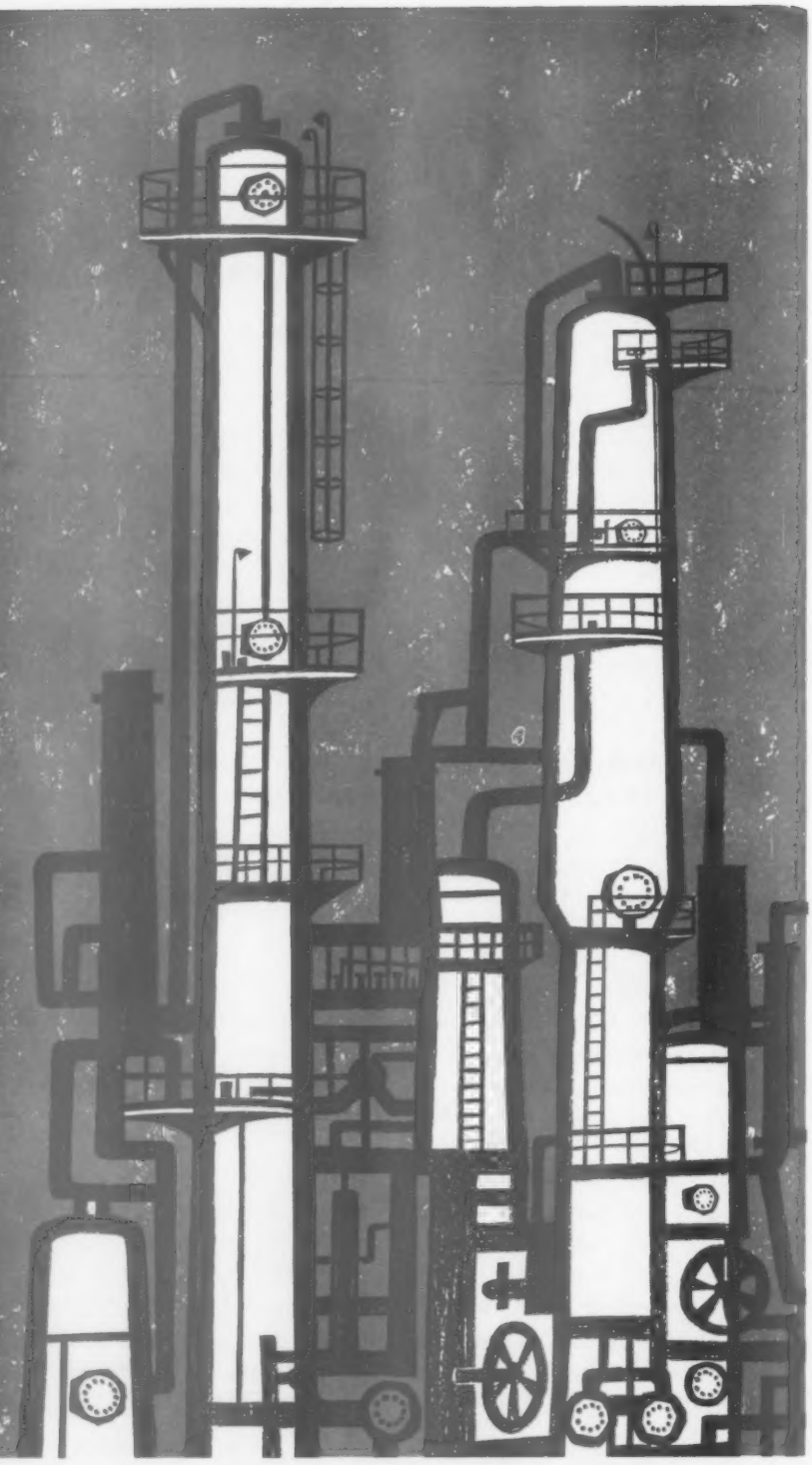
DIVISION OF THE DOW CHEMICAL COMPANY

PROOF OF PARSONS' PERFORMANCE

125 PROJECTS for 17 CUSTOMERS



The same 17 refiners have awarded a total of 125 jobs to Parsons.

WHY?

Because this group of long-time customers wanted us back on the job—time after time! They were satisfied with Parsons' performance on the first job . . . and subsequent jobs. This repeat performance is the true test of design, engineering and construction competence.

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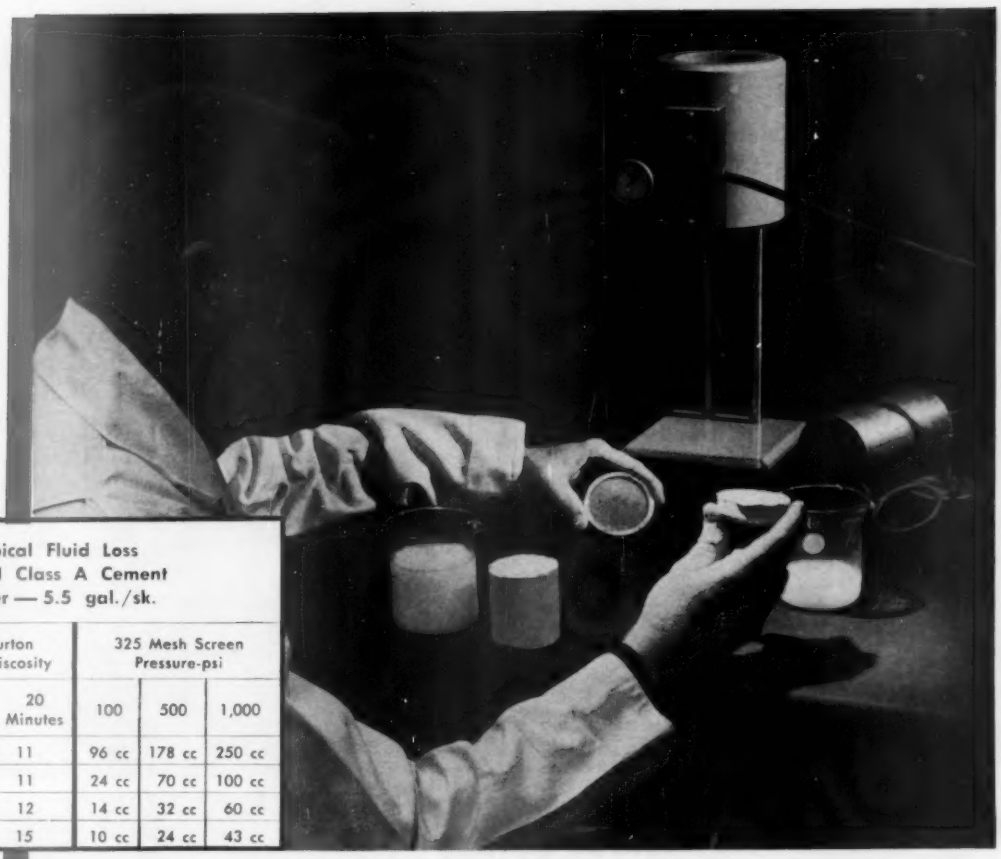

Typical Fluid Loss in API Class A Cement
Water — 5.5 gal./sk.

Per Cent Halad-9	Halliburton Slurry Viscosity		325 Mesh Screen Pressure-psi		
	Initial	20 Minutes	100	500	1,000
0.6	4	11	96 cc	178 cc	250 cc
0.8	4	11	24 cc	70 cc	100 cc
1.0	5	12	14 cc	32 cc	60 cc
1.2	10	15	10 cc	24 cc	43 cc

New Discovery Makes It Possible To

CONTROL CEMENTING FLUID LOSS WITH ALL CEMENTS, ALL ADDITIVES

Halad-9, Halliburton's new cement additive discovery, is another big step forward in controlling fluid loss in primary and squeeze cementing operations. Ability of Halad-9 to control fluid loss is illustrated above by comparison of the controlled filter cake build-up (in hand) obtained with one per cent Halad-9, and the dehydrated cement sample on the left, after both were subjected to the same API fluid-loss test.

Halliburton research tests show Halad-9 additive to be completely compatible with all API Class A, E, and Pozmix Cements. Compatibility also exists with cement additives such as bentonite, accelerators, retarders, and lost circulation materials.

EFFECTIVE ACTION — Usually 0.8 to 1.1 per cent of Halad-9 is adequate for squeeze cementing.

HEAT STABILITY — The low percentages of Halad-9 required for most slurries show excellent stability at bottom hole temperatures exceeding 200°F. The slight retarding characteristics of Halad-9 can be used to good advantage in hesitation squeeze cementing techniques — or can be modified if desired by an accelerator or additional retarder as well conditions require.

See your Halliburton man for recommendations on using this advanced new product.

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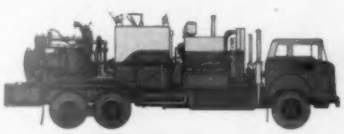
...just minutes away
from your well!



CEMENTING SERVICES

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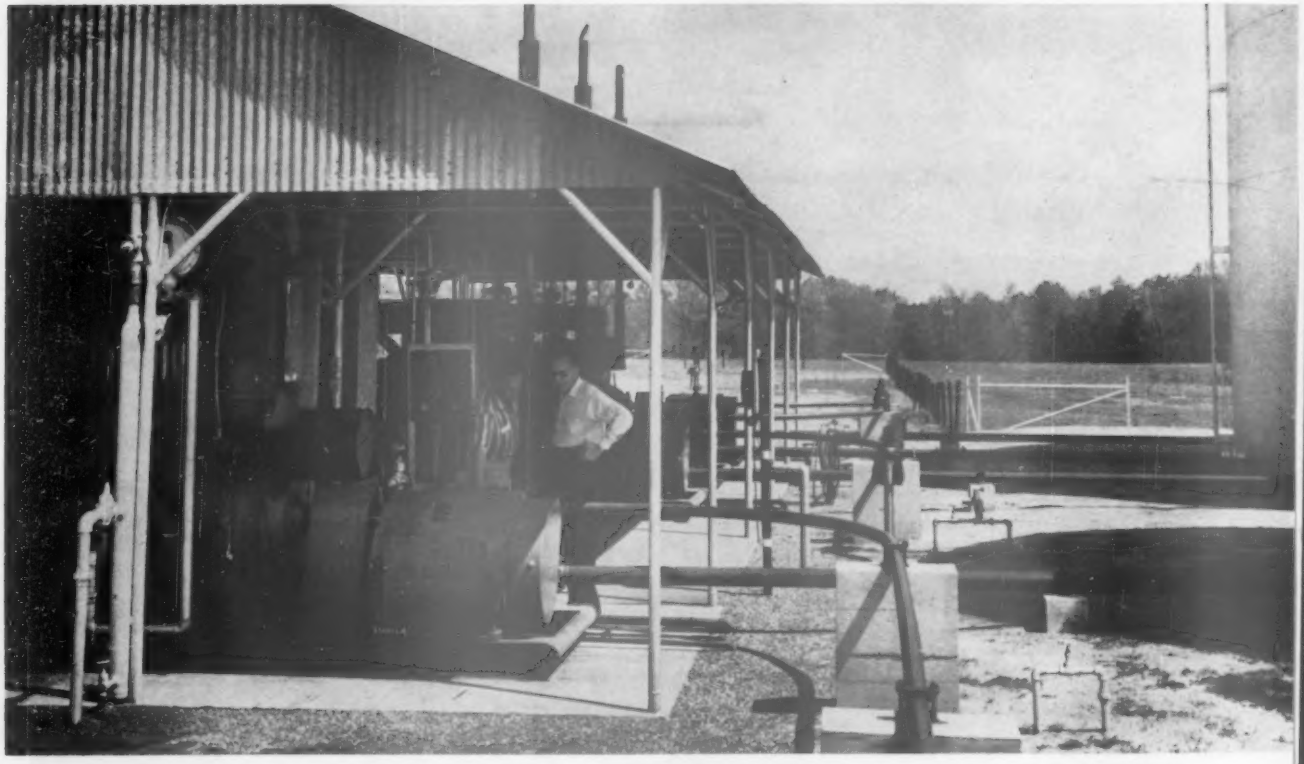
COMPANY · DUNCAN, OKLAHOMA



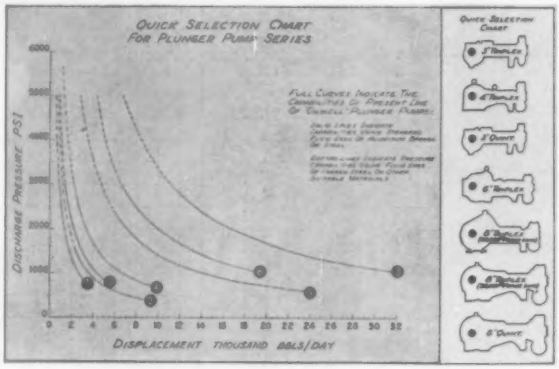
Why "Oilwell" waterflood pumps take it lying down

The pumps in the picture are operating in the New Odom field, and one of them has been pumping 24 hours a day for *eight months* without stopping. Naturally, it's an "Oilwell" pump and its design has a lot to do with its performance.

Every "Oilwell" plunger pump is designed horizontally for eight good reasons: *Low suction* . . . lowness of suction and discharge lines means maximum utilization of suction head and simplifies piping layout. *Less deadweight on crankshaft* . . . eases bearing loads, minimizes vibrational stress in frame and piping. *Simpler thrust transmission* . . . eliminates overhead yoke and pull-rod assemblies. *Cleaner installations* . . . any leakage is confined to frame cradle by gravity. *Natural valve motion* . . . fewer parts needed. *Low center of gravity* . . . reduces vibration that can cause piping stress and fatigue. *Safer maintenance* . . . does away with ladders and neck-craning. *Easier maintenance* . . . greater accessibility.

There's a wide selection of top-performing "Oilwell" Triplex and Quintuplex pumps for waterflood applications, LPG Flood, Pressure Maintenance, Formation Fracturing, Acidizing and Cementing, Salt Water Disposal, or you name it. Whatever your requirements, call on "Oilwell" for complete information and help in the planning stage.

USS and "Oilwell" are registered trademarks



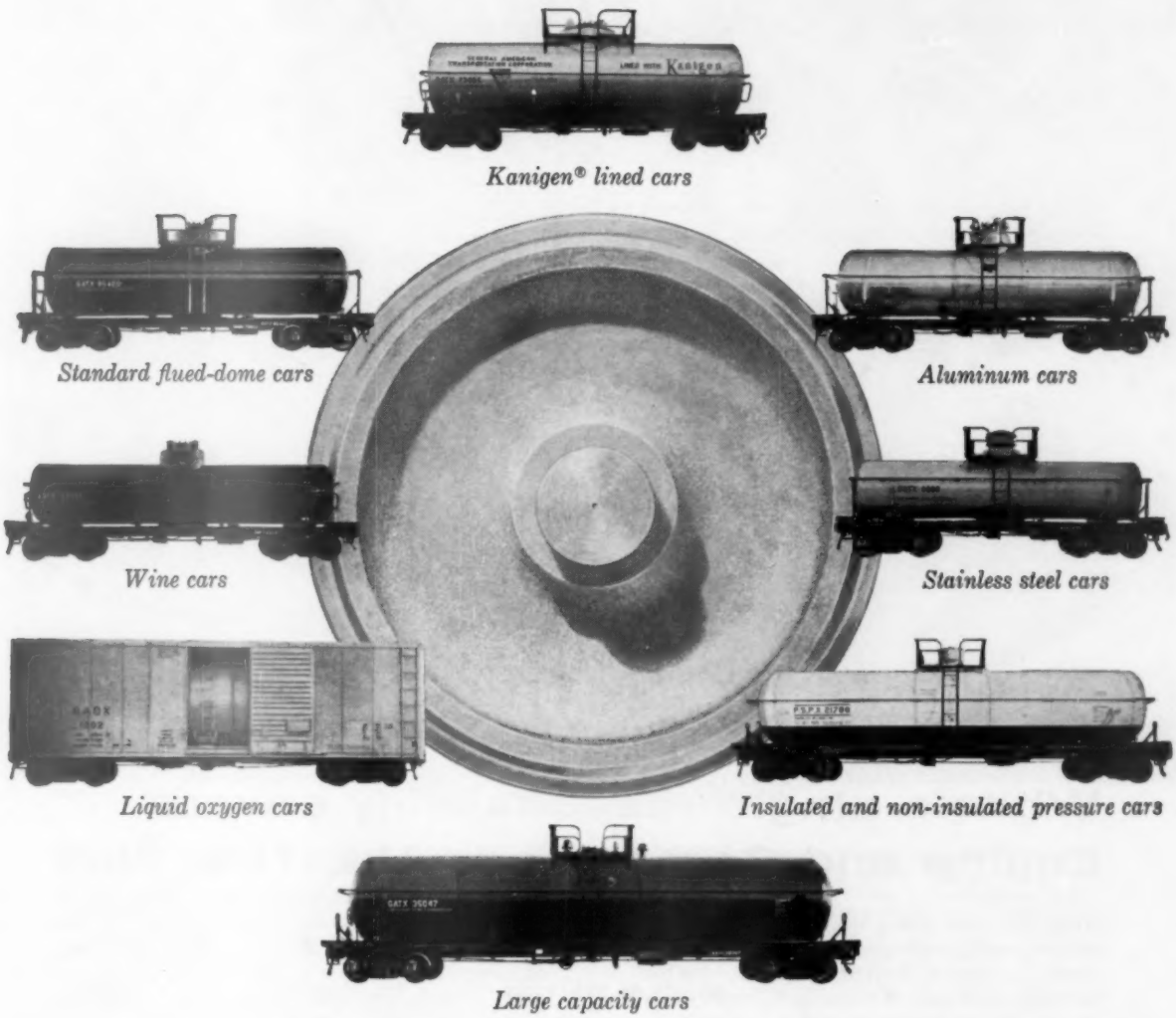
The plunger pump selection manual describes in detail "Oilwell's" complete line of seven primary pumps. Volume-pressure range curves make it a simple matter to pick the pump that's right for the job. Picking plunger sizes is simple, too, because you'll find complete performance data for all plunger sizes available with each size pump.

Write on your company letterhead for a free copy of "Oilwell's" Manual M29-1060. It's one of our ways of making sure that when you buy "Oilwell" equipment, you get a lot more than our product.

USS Oil Well Supply Division of United States Steel

Executive and Export Offices: Dallas, Texas

GATX builds them all!



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Wine cars

Stainless steel cars

Liquid oxygen cars

Insulated and non-insulated pressure cars

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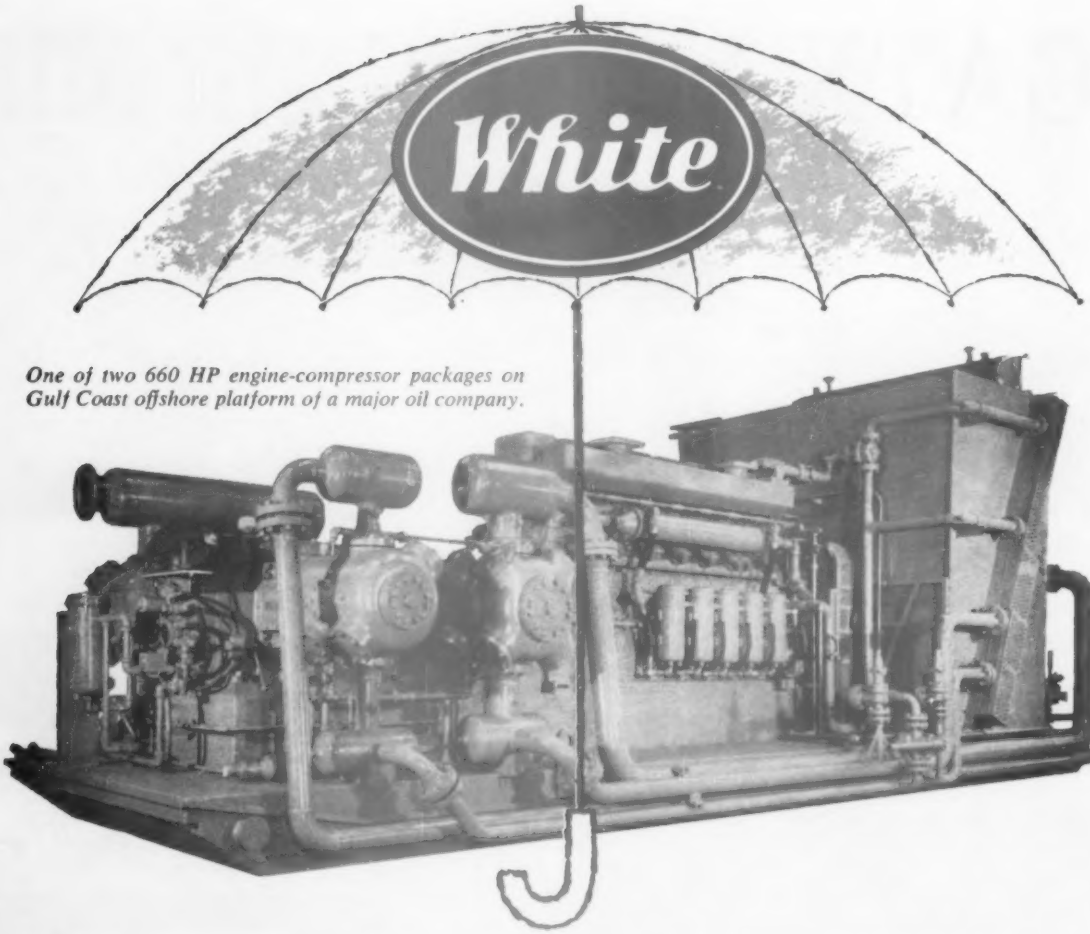
GATX GENERAL AMERICAN TRADE MARK



One of two 660 HP engine-compressor packages on Gulf Coast offshore platform of a major oil company.

White's single responsibility covers Engine and Compressor ALL THE WAY

White-Superior 200/1000 BHP Compressors are designed for exact match with Superior *medium speed* gas engines. Both units are precision built to identical standards at White in Springfield. White therefore assumes *complete and undivided responsibility* for all vital parts on its direct-driven, balanced opposed engine-compressor sets.

Single responsibility *all the way* starts with pre-engineering (selecting the right combination for your job) . . . extends through manufacturing, the installation alignment check-out and start-up. White also provides on-the-job training of your personnel for proper operation and maintenance of complete unit. You'll find factory service and parts readily available from White's extensive field service organization.

Two, four and six-cylinder, single or multi-service compressors are available properly packaged (see list) and ready for service. For engineering assistance or Bulletin 124, contact nearest White representative or write today to White Diesel Engine Division, Springfield, Ohio.

White DIESEL | Superior ENGINES

White Diesel
ENGINES / COMPRESSORS

WHITE'S AUTHORIZED PACKAGERS

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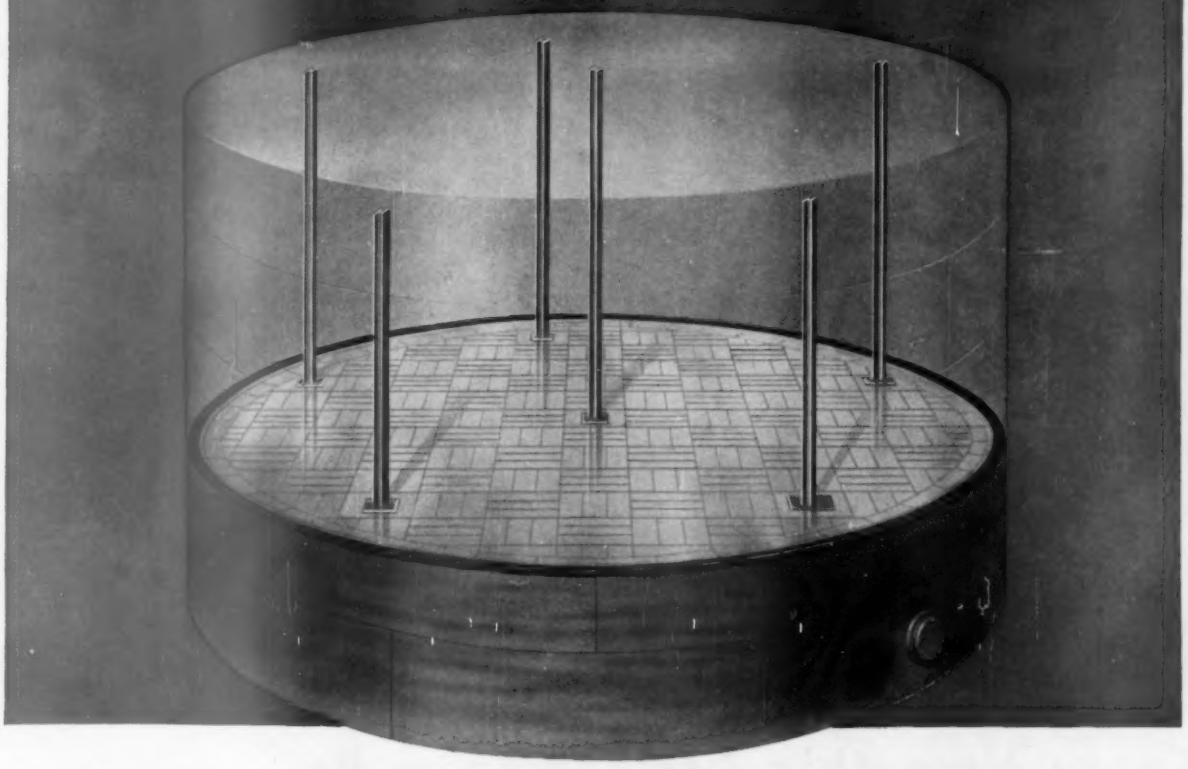
Canada	Stearns-Roger Engr. Co., Ltd.

HAMONDFLOTE COVER

the Internal Floating Cover for Fixed Roof Tanks

REDUCES EVAPORATION AT LOW COST



IMPERMEABLE • UNSINKABLE • ELECTRO-CONDUCTIVE • POSITIVE PERIPHERAL SEAL • ANY SIZE TANK • ANY NUMBER OF VERTICAL COLUMNS • The Hamondflote Cover provides a strong, rigid, permanently buoyant, extremely lightweight floating cover for liquids in tank storage. It minimizes evaporation losses, protects product quality and prevents corrosion. It pays for itself in months.

Write for Bulletin 204...it will help you to figure your evaporation losses in barrels and gallons...and your savings in dollars.

SIMPLE FIELD ASSEMBLY: The Hamondflote Cover can be installed by regular maintenance crews without special tools. The light modular polyurethane sandwich sections are effortless in handling. They are quickly and securely joined.

TOUGH, FLEXIBLE SEAL: The interlocking seal sections of the Cover are loops of Buna-N. The resilient, flexible annular ring created by the assembled sections always provides an effective seal.

STRONG, LIGHTWEIGHT BASIC SECTION: The Basic section of the Hamondflote Cover is a composite structure of polyurethane foam and aluminum. It is strong and light. Because the cellular composition of the foam is "closed," it will not admit liquid, thus assuring buoyancy, and rendering Cover unsinkable at all times.

PDM
ENGINEERS · FABRICATORS · CONTRACTORS

Pittsburgh-Des Moines Steel Company

12 plants to serve you coast to coast

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Every time this little disc pops it saves you important money!

This is a stainless steel rupture disc for the UNIBOLT Pressurematic Valve. When it breaks it costs you a few dollars . . . but it could save you thousands of dollars in wasted production or damaged surface equipment.

The UNIBOLT Pressurematic Valve — unlike any other high/low safety valve — employs a balanced piston design, i.e., a small piston exposed to high pressure (well head) is balanced against a large piston exposed to low pressure (flow line). When the flow line pressure is increased or decreased beyond a predetermined point, the Pressurematic Valve closes instantly, automatically.

For example, a broken flow line would lower the pressure under the large piston and the valve would close. Hydrate freezing or a closed valve, for example, would increase the flow line pressure. But before this pressure build-up could burst the flow line or blow up other low pressure surface equipment a rupture disc in the Pressurematic Valve would pop, causing the pressure under the large piston to drop and, again, the valve would close.

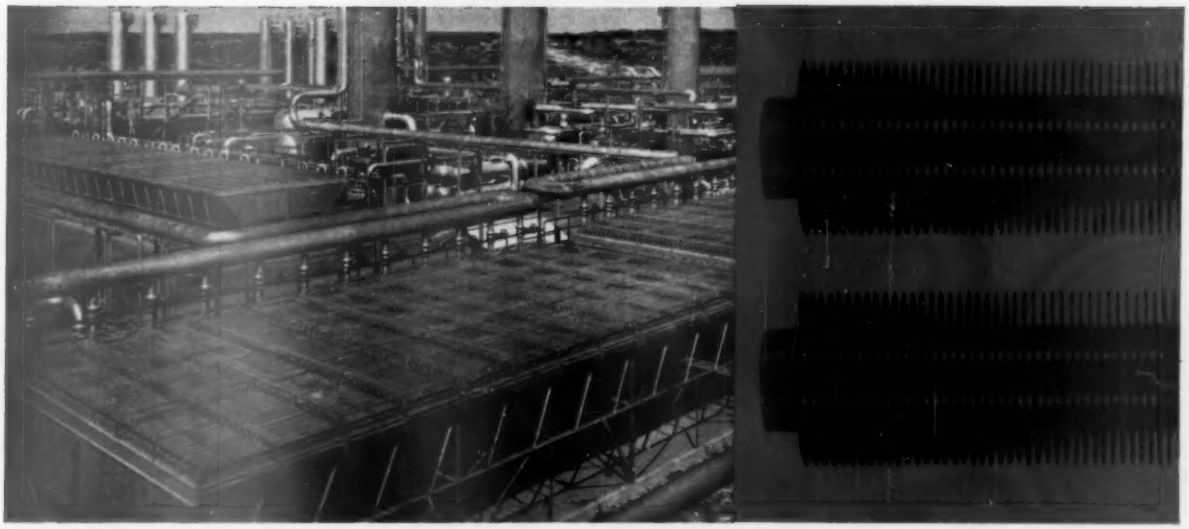
So, as long as the rupture disc in your Pressurematic Valve doesn't pop, your well and your surface equipment have the finest protection available against numerous field hazards. And when it does pop, you've spent a few dollars to save many!

UNIBOLT

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

IT'S CHEAPER TO KILL HEAT WITH AIR



COMPARE TRANSAIRE . . . no matter what your water situation. Transaire air-cooled heat exchangers already have found wide acceptance in areas where water cooling is impractical or impossible. And now, finding that Transaire is less expensive to operate, even where water is plentiful, other areas are turning to this economical unit.

Simple in basic design, Transaire units are being used in many varied operations where low maintenance and low operating costs are important over extended periods of time. The high heat transfer efficiency is attained by use of the Yuba fintube. Its exclusive design employs tapered spiral fins mechanically bonded so that the entire base tube is covered and protected against the galvanic action that destroys efficiency in many other types of fintube. Both fins and base tubing can be provided in almost any material, size or gauge desired. Fin spacing and height can be varied to requirements. It's cheaper to kill heat with air – next time compare Transaire, a product of Yuba, pioneers in air-cooled heat exchangers.

Yuba also manufactures a complete line of shell and tube heat exchangers, and will recommend either type, whichever is required or best suited for the job.

YUBA

specialists in heat transfer equipment

YUBA HEAT TRANSFER CORPORATION

Tulsa, Oklahoma

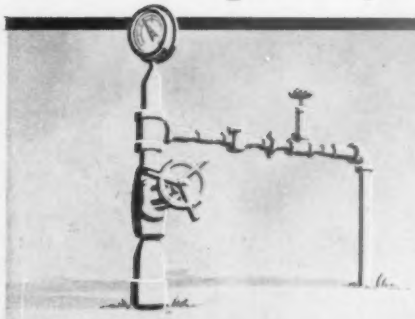
YUBA CONSOLIDATED INDUSTRIES, INC.

Sales Offices in Chicago • Houston • Los Angeles • New York • Pittsburgh • San Francisco

INTERNATIONAL LICENSEE: Birwelco Ltd., Birmingham, England (United Kingdom, British Commonwealth).

another
TRETOLITE SERVICE
report

Backwashing with FLUDEX *increases injection system input by 3952 barrels per day!*



INJECTION PRESSURES RETURN TO NORMAL; NO ADDITIONAL PUMPING EQUIPMENT NEEDED!

THE RESULTS:

WELL NO.	BEFORE Input bbl/day	Treating Pressure	AFTER Input bbl/day	Treating Pressure
1.	190	950	275	900
2.	400	800	810	700*
3.	120	900	900	750*
4.	165	800	900	750*
5.	100	900	950	750*
6.	60	900	110	800
7.	200	900	650	800
8.	5	900	265	750*
9.	3	950	335	450*

*Water Input Restricted by Valve.

Calcium carbonate accumulations were plaguing this nine-well injection system in Oklahoma. Formation restrictions caused increased injection pressures. (Wells completed open hole with 5-inch casing set as tubing string.)

How FLUDEX *treatment was handled*

Workover tubing string was run. Thirty barrels of water were flushed through tubing and out casing annulus. Five gallons of FLUDEX* Water Flood Additive were spotted on bottom and flushed over formation and out casing annulus by injecting 40 barrels of water through tubing. After this, five gallons of FLUDEX, mixed with 10 barrels of water, were forced into the formation and followed by 20 barrels of injection water.

This FLUDEX backwash enabled the operator to increase water injection by 3952 bpd, while maintaining desired injection pressures in the system. These larger input volumes with less pumping costs resulted in real savings.

For additional information on FLUDEX applications, contact your Tretolite Field Service Engineer.

*Registered Trademark of Petrolite Corporation

TWF-60-5

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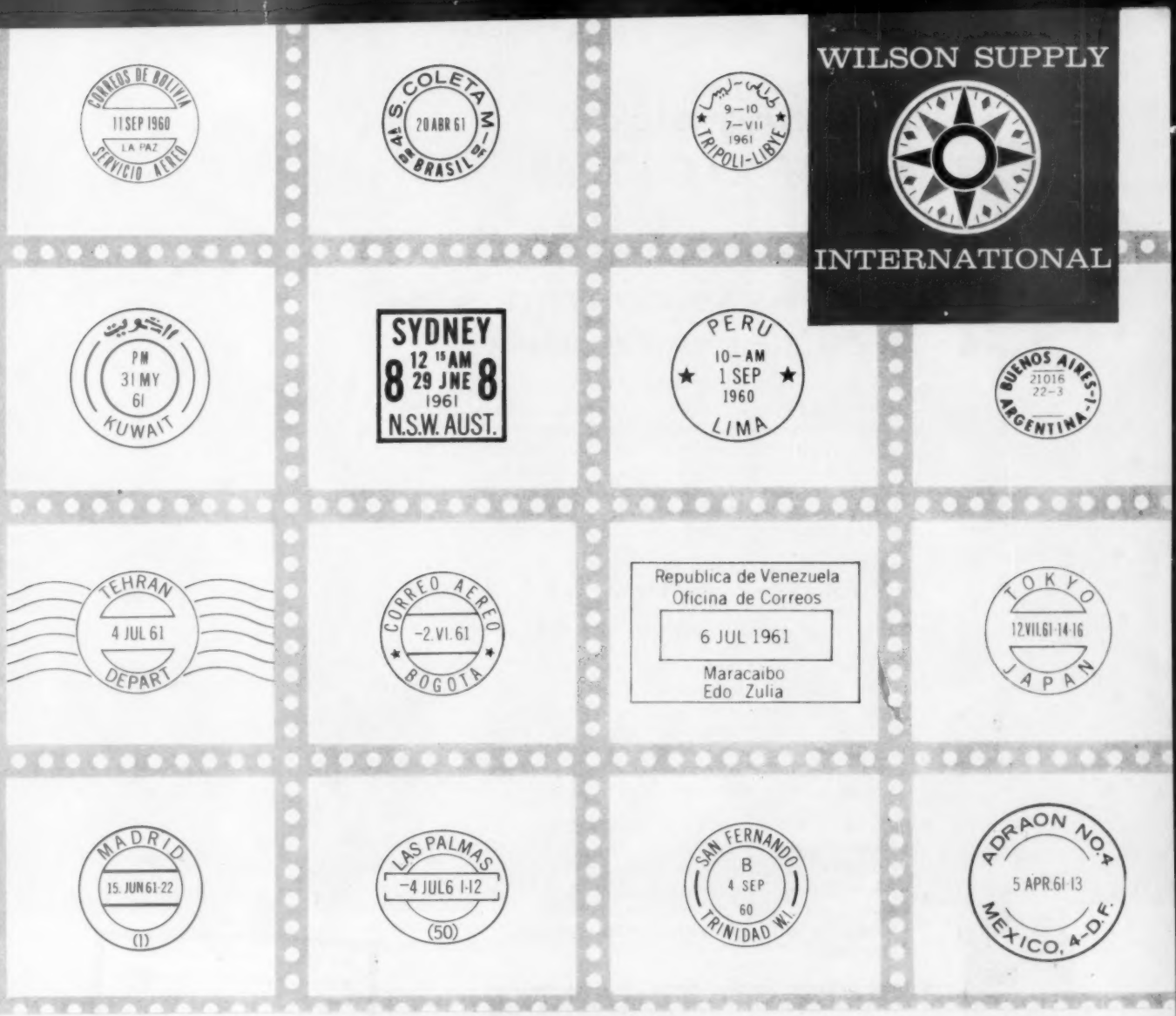

WILSON SUPPLY

INTERNATIONAL

Stamp Of Approval —WORLDWIDE

In the short span of three years, Wilson Supply International Division has received the stamp of approval for its service to oil producers around the world.

Oil men have found the Wilson Supply International offices in Houston and New York staffed with veteran supply men, experienced in handling equipment needs for overseas operations. At the other end of the line, the Wilson Supply International representatives have an earned reputation for expediting equipment, rendering fast field service.

Maintenance supplies or a complete drilling rig . . . your Wilson Supply International representative will get you *what* you want . . . *when* you want it. That has been the byword of Wilson Supply operations for 40 years. Write for catalog information on the complete lines represented by Wilson Supply International.

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INTERNATIONAL DIVISION
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ROCKEFELLER PLAZA, NEW YORK, N.Y.
CABLE ADDRESS: WILSON

Our 40th Year of Service to the Petroleum Industry

Oil & Gas Supplies • Tubular Goods • Production Equipment • Drilling Machinery • Packaged Compressors • Fishing Tools

6102

oilmaster

building block SIMPLICITY

a new concept in **WELLHEAD CONTROLS** for hydraulic **FREE PUMPS**

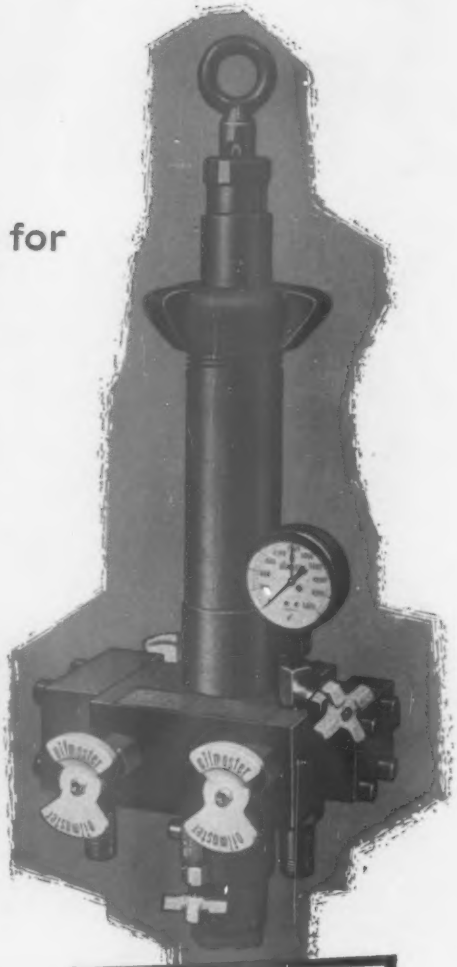
...to extend the versatility of this unique pumping system. The free pump, which substantially reduces well pulling costs, can now be safely retrieved—**unattended.** The Oilmaster Wellhead Control is safety engineered to stand guard during the pump-out operation, securely latch the surfaced unit and then bypass the circulating fluid. The pumper can remove the surfaced unit from the wellhead at his convenience.

CHOOSE THE "BUILDING BLOCKS"
—to fill your individual well requirements. Only the Oilmaster Wellhead Control provides this economy with maximum safety, flexibility and simplicity.

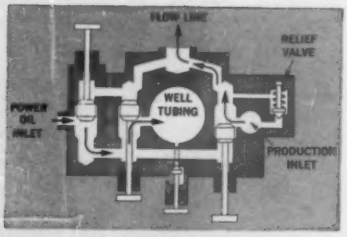
FAST, SHOCK-FREE SWITCHING
of flow direction is designed-in through use of independent double seated valves. Dependable operation with minimum maintenance cost is assured by replaceable stainless steel valve seats and stems and pressure actuated teflon stem packing. The control block is free swiveling to ease installation at the well.

FILL YOUR NEEDS WITH THESE OPTIONALS
- **Catcher Assembly**—Regular or Indicating
- **Catcher Nipple**—Regular or Extended
- **Power Oil Inlet**—Regular or Bypass
- **Relief Valve**—Shear Disc or Automatic Reset
- **Production Inlet**—Casing Free or Slip Joint Union
- **Lubricator**

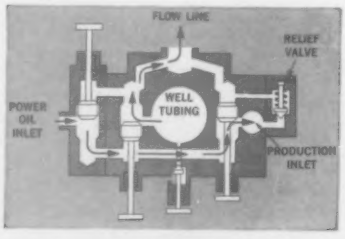
These optional "building blocks" give you the economic, safe flexibility to meet your specific Free Pump Wellhead Control requirements and your budget. **Complete details are available in Bulletin 6102.**



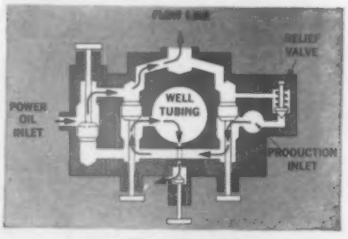
for the full story on Oilmaster Hydraulic Pumping Systems, see your local Oilmaster or distributor representative or write Fluid Packed Pump, Armco Steel Corporation, 9100 S. Norwalk Blvd., Los Nietos, Calif.



PUMP IN & OPERATE



PUMP OUT



BY-PASS & BLEED

DISTRIBUTED BY: Beacon Supply Company • Dominion Oilfields Supply Company, Limited • Industrial Supply Company • National Supply Division, Armco Steel Corporation • Union Supply Company

ARMCO Fluid Packed Pump

2-pen Foxboro Dynalog Recorders chart both upstream interface profile and station profile on Phillips' two pipelines. Upstream record allows operator to select best cut point well in advance of interface's arrival.

Automatic Foxboro interface detection system eliminates guesswork at Phillips pipeline terminal

operators get interface profiles in advance...know exactly when to switch tanks

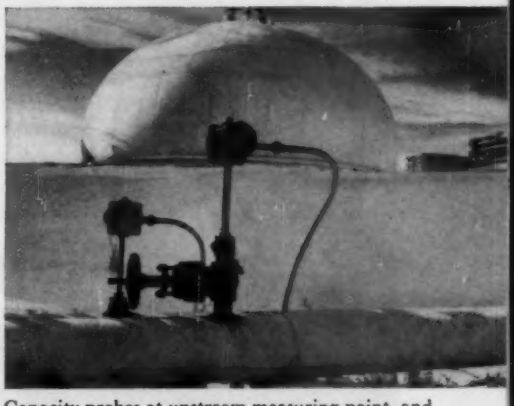
There's nothing haphazard about interface detection at the Phillips Pipe Line Company Terminal in East Chicago, Indiana. A Foxboro Interface Detection System sees to that.

This unique Foxboro system is based on the fact that even slight differences in grades or brands of petroleum products have measurably different dielectric constants. Sensitive Capacity Dynalog* Recorders measure this difference, both at the pipeline delivery station, and at a point 3 miles upstream. Foxboro Teletax* Telemetering brings the two measurements together on a single chart at the delivery point.

From the shape of the upstream record, the operator selects the best cut point and sets his index. When station interface record matches index, switch-over is made.

Phillips dispatchers find their Foxboro system eliminates sampling and guesswork — cuts product contamination to a new minimum. It can do the same for you. Ask your Foxboro Field Engineer for full details, or write for Bulletin 20-11. The Foxboro Company, 6012 Neponset Ave., Foxboro, Mass.

Reg. U.S. Pat. Off.

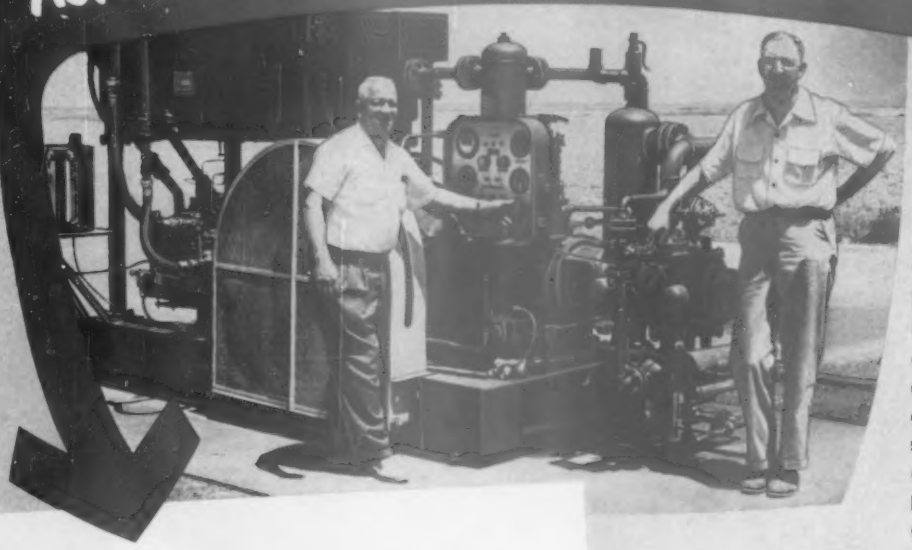


Capacity probes at upstream measuring point, and at terminal (shown above) measure dielectric constant of product passing through pipeline. Upstream measuring station is unattended — profile is telemetered to Dynalog Recorder at terminal.

FOXBORO

REG. U.S. PAT. OFF.

AJAX makes happy Compressor Customers



Two of Mr. Payne's happy customers: Clyde Allison (left) and L. F. (Lou) Andersen, independent oil field production service operators, Co-owners of A & A Production Service Co. (Glenn, Calif.)

PAYNE OILFIELD EQUIPMENT LEASING COMPANY

3851 LONG BEACH BOULEVARD • LONG BEACH 7, CALIFORNIA
TELEPHONE GArfield 4-1612

June 5, 1961

Mr. John Rudolph
Vice President
Ajax Iron Works
Corry, Pennsylvania

Dear John:

In the leasing of gas compressors both we and our customers demand the finest equipment available. We are repeatedly reordering your Ajax DPC-60 compressor for service to our Northern California customers for boosting at the well site and producers from [illegible] to meet pipeline pressures.

The qualities we find in this equipment most important are as follows:

Low maintenance and operating cost.

Reliable and dependable service under continuous operation.

Compact and portable construction.

Economic installation and re-installation expense plus every reasonable device for safe operation under unattended operating conditions frequently remote from habitation.

Mufflers used in connection with these operations have reduced the noise level to a point whereby there is no problem even though the installation is adjacent to habitation.

Perhaps most important of all, the operating personnel in the field are most enthusiastic about this piece of equipment and hence, as any businessman would know, it gets the best of attention as a result of that attitude.

Yours very truly,
PAYNE OILFIELD EQUIPMENT LEASING CO.
W. S. Payne, Jr.

"We are repeatedly re-ordering your Ajax DPC-60 compressor for service to our . . . customers for boosting at the well site . . ."

". . . the operating personnel in the field are most enthusiastic about this piece of equipment and hence, as any businessman would know, it gets the best of attention as a result of that attitude . . ."

Whether buying or leasing equipment, specify Ajax compressors, engines, and pumps. Proved economy, performance, and low maintenance costs. Units designed for extended non-attendant operation and matched to do your specific job.

AJAX

ALWAYS A FULL DOLLAR'S VALUE IN AJAX PRODUCTS

AJAX COMPRESSORS

ALSO BUILDERS OF

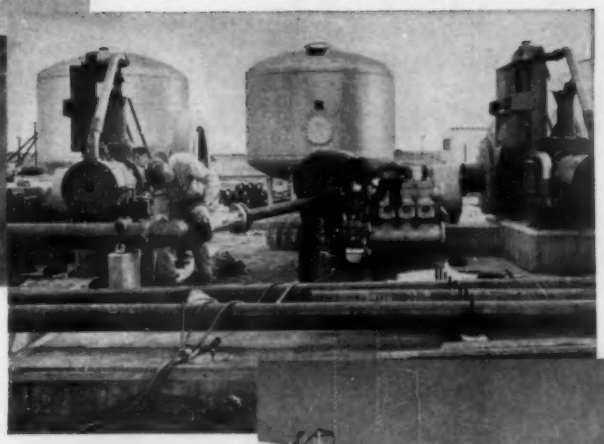
ENGINES . . . PUMPS

AJAX IRON WORKS CORRY, PENNSYLVANIA
Oil Field Distributors

- The National Supply Co. — Pittsburgh, Pennsylvania
- Bethlehem Steel Co. — Supply Division, Tulsa, Oklahoma
- Mid-Continent Supply Co. — Fort Worth, Texas

BEFORE . . .

Bethlehem Knows Waterflooding



DURING . . .

AFTER . . .

INSIDE . . .

OUTSIDE . . .

The plant illustrated was turnkeyed by Bethlehem in Colorado. Only nine weeks in erection, its four TP-6 Bethlehem Triplex Pumps, driven by DP-115 Ajax gas engines, inject 30,000 BPD at 629 psi. Total price installed: approximately $3.85 per BPD injection rate.

Twenty years ago—when waterflooding was but a drop in the oil bucket—we packaged our first secondary recovery plant. Since then, more than 120 projects, both turnkey and package, have been designed and built under the guidance of Bethlehem engineers. And the tide is still coming in.

Let us put our experience to work for you. Whatever your flood problem, we've probably met it before for someone else.

Write for Booklet 1655, *Bethlehem Waterflooding Services.* Or let us have one of our engineers consult with you.

BETHLEHEM STEEL COMPANY, SUPPLY DIVISION

General Offices and Export Dept.: 21 East Second St., Tulsa Okla.

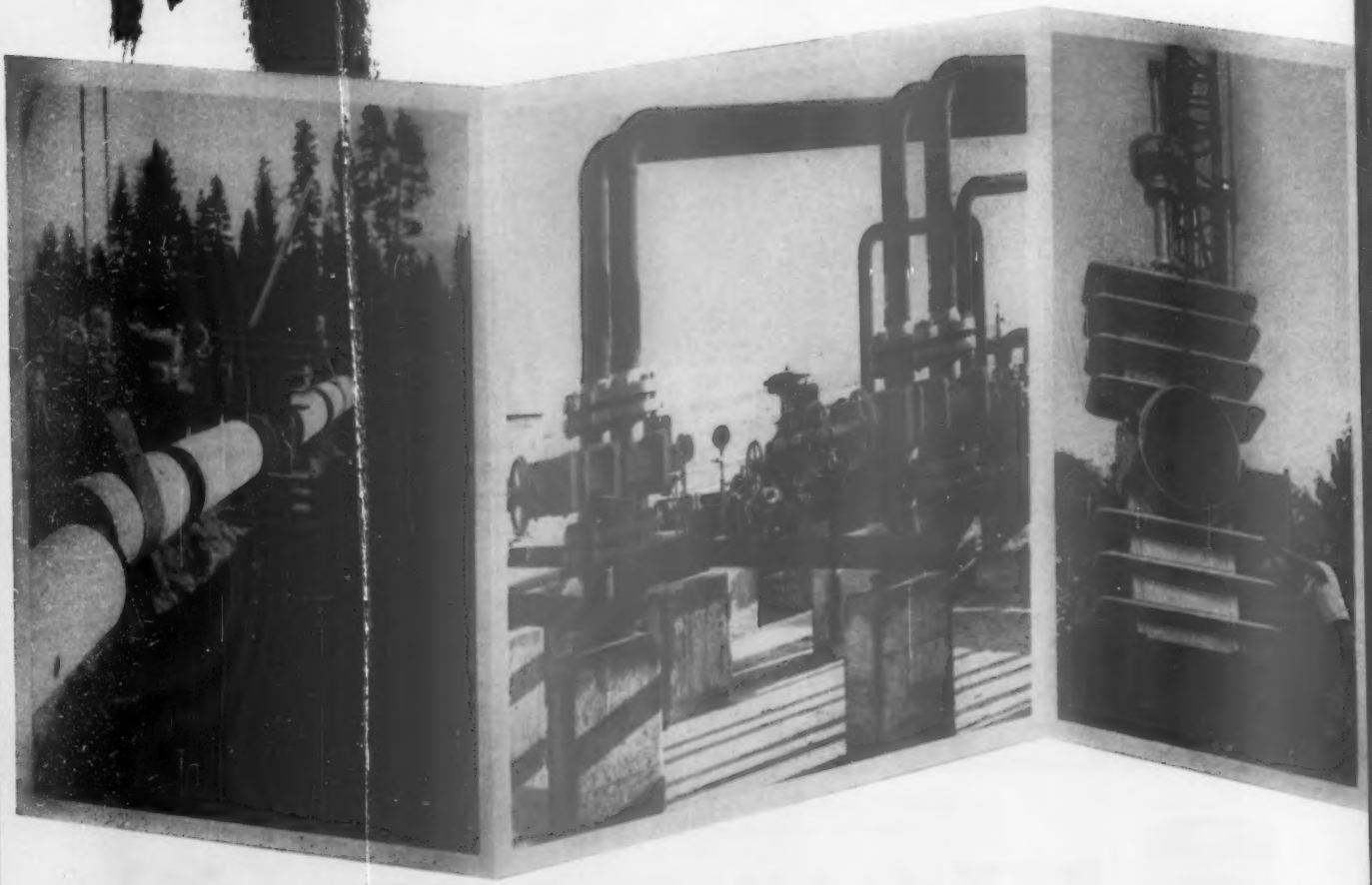
BETHLEHEM STEEL

BETHLEHEM STEEL

SUPPLY DIVISION

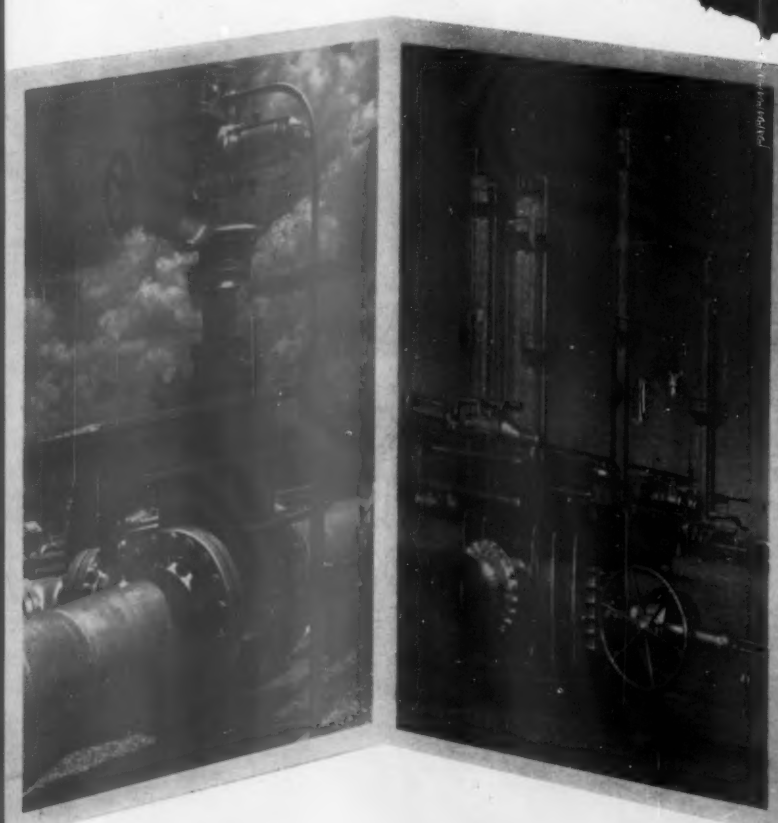
A LIST AS LONG

The "Profit-Minded"



AS YOUR ARM*

companies using proven Grove G-4 Seal-"O"-Ring® Valves



*We'll be glad to send you a copy!

The worth of a valve can often be measured by the companies it serves. And Grove Series G-4 pipeline valves have been performance-proved by hundreds of profit-minded transmission, distribution, crude and product pipeline companies! All over the world, the patented Seal-"O"-Ring design of Grove G-4 valves has been delivering dependable, positive, bubble-tight closing—without the expense and nuisance of periodic lubrication or adding of sealing compounds! Look around for the valves with the "hoop ribs." You'll be impressed with the broad acceptance of Grove Series G-4 gate valves in gas, crude and product service.

GROVE PIPELINE VALVES

GROVE VALVE AND REGULATOR COMPANY
a subsidiary of Walworth
6529 Hollis Street, Oakland 8, California
Offices throughout the U. S. and in Western Canada

Overcome Your Drilling and Coring Problems . . .

. . . with Christensen diamond bits and core barrels custom designed, through experience, engineering and research, to lower your cost per foot. Delivered, on time, from manufacturing plants throughout the world. Call your Christensen office today.

"Less cost per foot"

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SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS

Write for our new Catalog SD-609

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Only Baroid gives
Complete Mud Service
Baroid's mining, manufacturing, quality control, new-product research, warehousing, delivery and engineered application are integrated into a single chain of service.
Wherever you drill, Baroid has mud stocks nearby. Delivery is fast and accurate. You can secure all needed mud materials from a single source. Baroid's third-of-a-century in the mud business gives you the greatest depth of experience and breadth of service. Baroid's unified operation helps you keep rigs on schedule and operating costs at a minimum.
You save drilling and completion dollars with a Baroid *complete* mud program.
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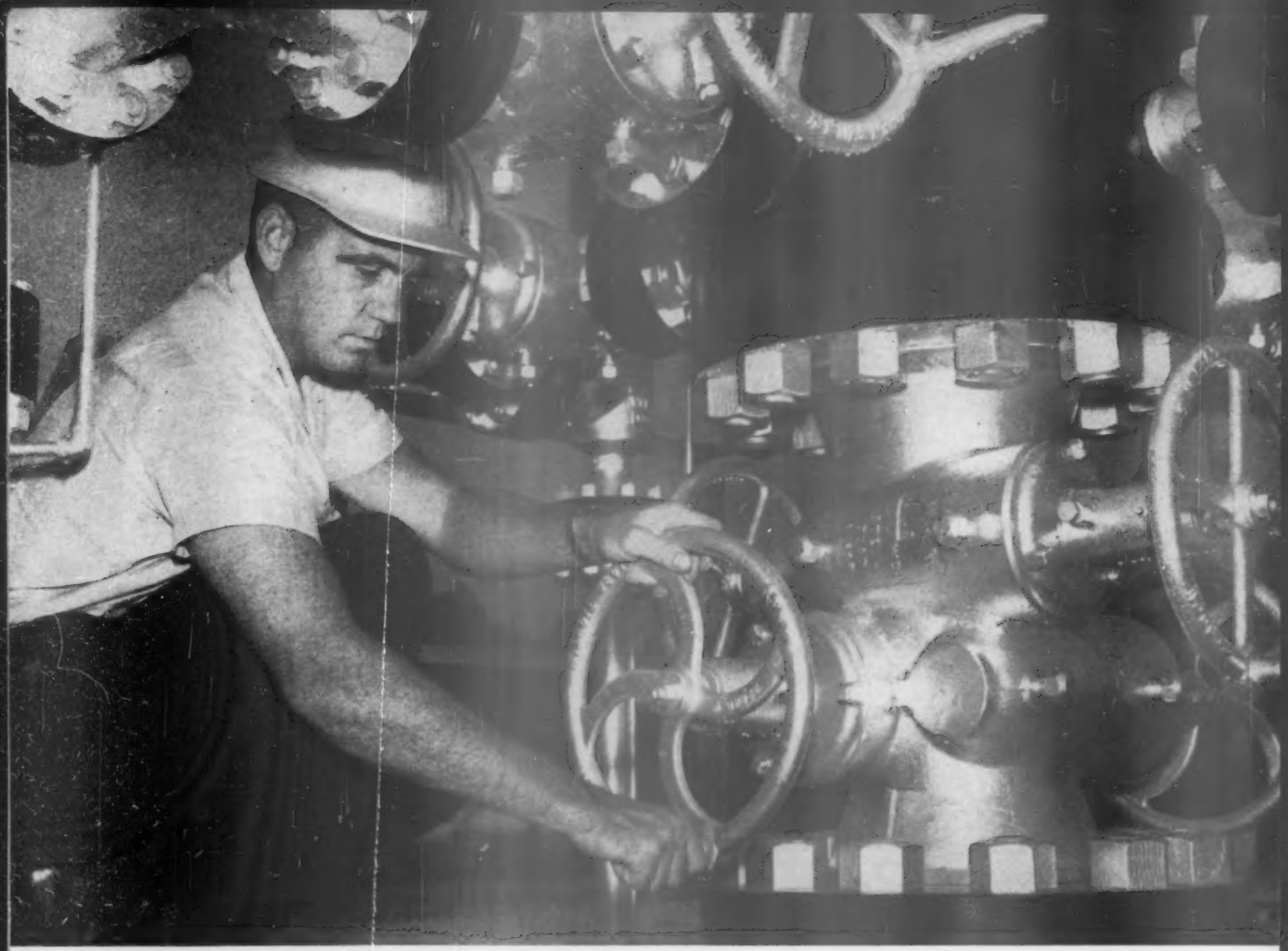


GET POSITIVE CONTROL . . . HIGHEST RELIABILITY

Specify W-K-M Quadruple Completion Valves

This W-K-M Quadruple Completion Valve controls the flow of oil and gas from four different producing levels for a large Southwestern oil company. This is a demanding application typical of hundreds of other similar jobs for which W-K-M Multiple Completion Valves are selected. Here are a few of the reasons why: Christmas Trees with W-K-M Quadruple Completion Valves are easier to build and install than those with equivalent components. They deliver the highest level of reliability. W-K-M Valves are easy to repair, easy to operate, and non-lubricated, requiring a minimum of maintenance. Available in 2" size, pressures up to 5000 psi. For full details write for Catalog 200. P. O. Box 2117, Houston, Texas.

WHEN SO MUCH DEPENDS ON A VALVE . . . *Specify* **W-K-M**

W-K-M
DIVISION

ACF INDUSTRIES

P. O. BOX 2117, HOUSTON, TEXAS

6118

Petroleum Storage Tanks of Greater New York Terminal, before backfilling operations. Coating Contractor: West Virginia Paint and Tank Co., Passaic, New Jersey.

Miles Howie, West Virginia Paint and Tank Co., says:

"You only get one chance on buried tanks and you'd better be right the first time!"

That's the way Mr. Howie, Manager of the coating application firm, summarized the approach to protection of these buried storage tanks for Greater New York Terminal. Mr. Howie continued, "We had to lick a serious corrosion threat from salt water penetration of the loamy dockside soil. The coating used had to stand up indefinitely, because of the prohibitive expense of excavating and recoating after the filling operation has been completed."

Bitumastic No. 50, a heavy-duty coating with excellent resistance to water absorption, was selected to protect these petroleum storage tanks, located at Greater New York Terminal, Inc., in Astoria, Long Island. Fast application and excellent bonding characteristics were additional factors in this coal-tar based coating's selection. As Miles Howie put it, "Based on our past experience with Koppers coatings, we know that nothing beats Bitumastic for this heavy service work."

You, too, can find a solution to your corrosion problem in the complete family of Bitumastic coal tar based coatings. For more information, call your Koppers representative or send the coupon. Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto.

KOPPERS

KOPPERS
BITUMASTIC
COATINGS AND ENAMELS
another fine product of COAL TAR

KOPPERS COMPANY, INC., Tar Products Division
Dept. 104M, Pittsburgh 19, Pa.

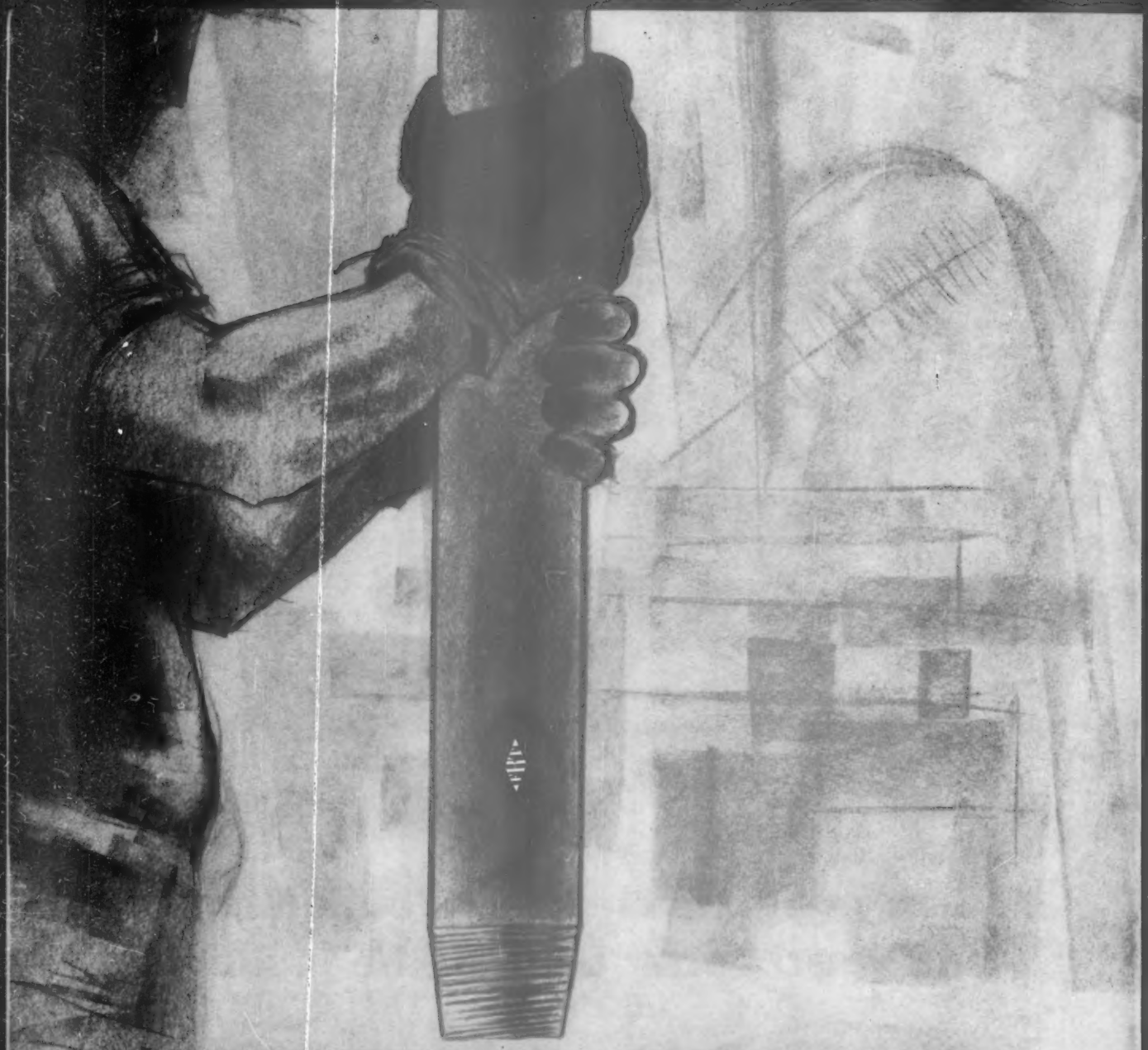
Gentlemen:
Please send me more information on the Bitumastic family of protective coatings.

Name_____

Firm_____ Title_____

Address_____

City_____ Zone____ State_____



FBT

COMPTOIR F. B. T.

SOLE EXPORT

ORGANIZATION

FOR 5 API LICENSED

PIPE MANUFACTURERS...

API SEAMLESS CASING, TUBING, DRILL PIPE.
INTEGRAL JOINT CASING AND TUBING.
API SEAMLESS OR WELDED LINE PIPE.
FOR DETAILS, KINDLY REFER TO THE COMPOSITE CATALOG.

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COMPTOIR FRANCO-BELGE D'EXPORTATION DES TUBES D'ACIER-23-27, AVENUE DE NEUILLY-PARIS (16e). CABLE ADDRESS: TUBACIER-PARIS. TELEX: TUBACIE-PARIS 27076

"Matched Tools for Unmatched Performance"

WEB WILSON

"CHAMPION" ELEVATOR...

THE UNMISTAKABLE LOOK OF PROGRESS

On rigs where concern is for increased crew efficiency and safety, at reduced costs, you'll find Web Wilson "Champion" elevators at work. Three unique reasons make these elevators the wise choice:

1. *Forward Swept Link Arms* permit easier handling in picking up and laying down pipe.
2. *The Slanted Hinge Pin* makes closing easier and under loaded conditions transfers a portion of the force from the latch to the hinge.
3. *Superior Balance* allows elevators to roll easily in the links. Better balance reduces the need for a balancing strap.

Add to these advantages the massive safety latch designed into the body so that the elevator will not be accidentally opened or damaged. Automatic latching results by the simultaneous action of latch and latch lock which close together.

Write for brochure "A New Dimension in Elevators."

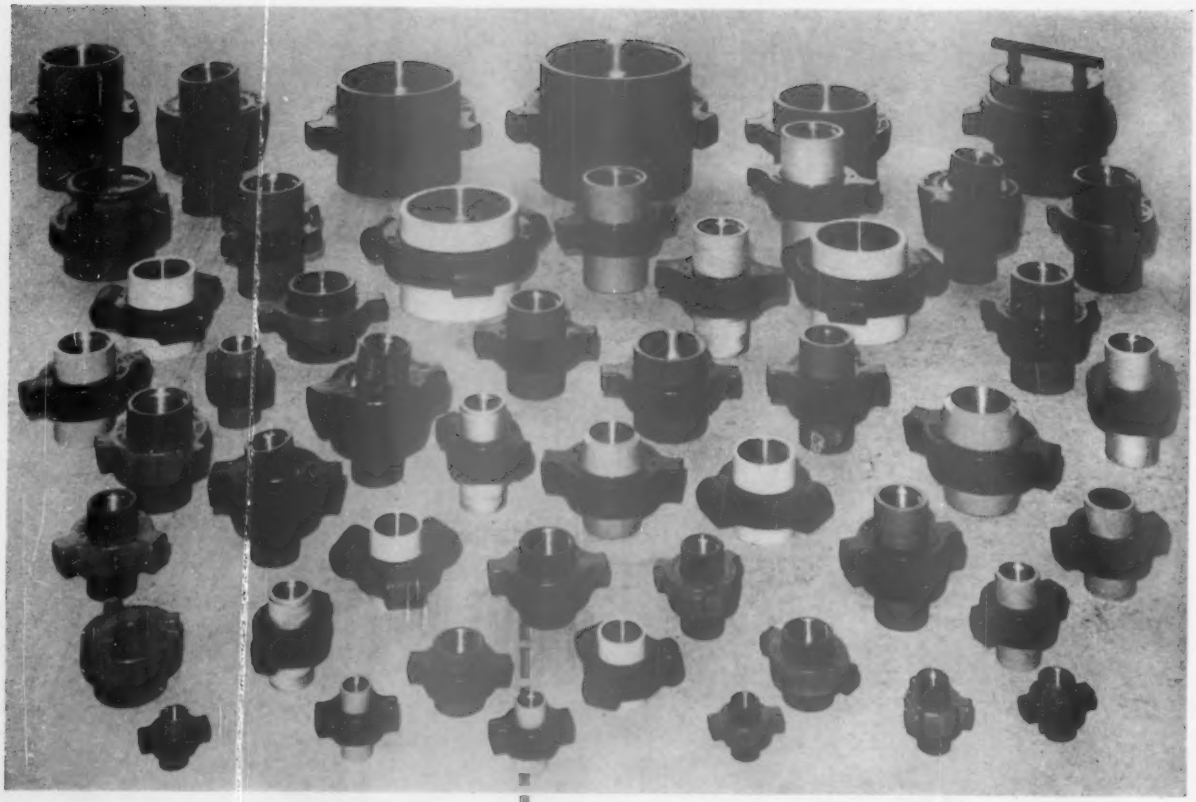
BAASH-ROSS

DIVISION OF JOY MANUFACTURING CO.

General Offices: Houston, Texas

OUR 42d YEAR OF PROGRESS

JOY



STANDARDIZE WITH WECO

MOST COMPLETE LINE OF WING UNIONS IN THE WORLD

THERE'S A SIZE, TYPE AND PRESSURE RATING FOR EVERY OIL INDUSTRY SERVICE

Here is part of the most complete line of wing unions in the world. Sizes range from 1" through 12"; pressure ratings from 1000 psi to 15,000 psi. The line includes pump suction, mis-aligning, insulated, flat face and blanking unions, in addition to standard types.

From this complete line you can choose exactly the union you need for every piping and fitting requirement on your drilling rig . . . for field headers and manifolds . . . for tank, separator, heater, treater and other production equipment installations . . . for cementing, acidizing, and fracturing service equipment. Standardizing with WECO Unions in all of your operations simplifies piping hook-ups; saves time on fitting and equipment installations; eliminates the problem of mis-matched piping connections; reduces inventory and replacement costs.

For detailed specifications on all WECO Unions see your WECO representative, or write for catalog.

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WELL EQUIPMENT MFG. CORP.
P. O. BOX 19483 • HOUSTON 24, TEXAS

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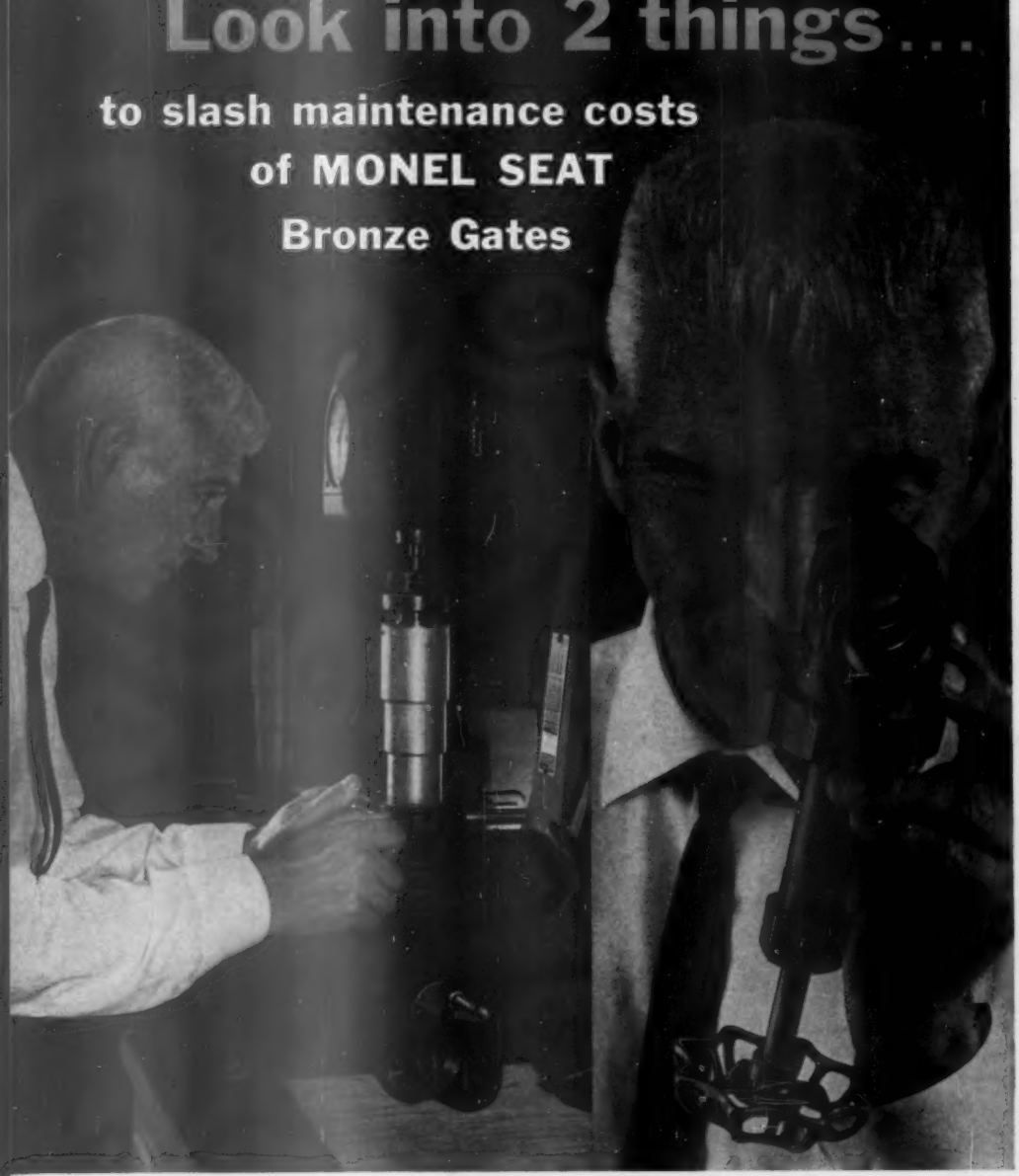
Look into 2 things...

to slash maintenance costs of MONEL SEAT Bronze Gates



What is the RELATIVE HARDNESS of the Wedge and the Seat Rings?

If the bronze or nickel alloy wedge is less hard than the monel seat rings, the wedge will wear. That is GOOD . . . with the wedge taking the wear, the seat rings will NOT wear, at least, not enough to worry about. So, you avoid the costly, time-consuming task of replacing seat rings or valve body. It's a cinch to replace a worn wedge . . . merely slip off the old wedge and slip on the new.

How are SEAT RINGS SECURED in the body?

A seat ring leak in a Bronze Gate Valve means big trouble and expense! To avoid it, be sure there is no possibility of seat rings loosening, shifting or deforming. Permanent, all-around support is the only sure protection and to provide it Jenkins expands (flares) seat rings into the body by a special process. This becomes practical when the wedge takes the wear and seat rings last for years and years. There's no need to replace seat rings.

JENKINS HAS THE ANSWERS

— to simpler, lower-cost maintenance. Jenkins gives you a wedge that takes the wear to save the seat rings. Jenkins expands seat rings into the body. These are only 2 of the money-saving features of Jenkins MONEL SEAT Bronze Gates and other types of bronze gate valves stocked by your local Jenkins Distributor.

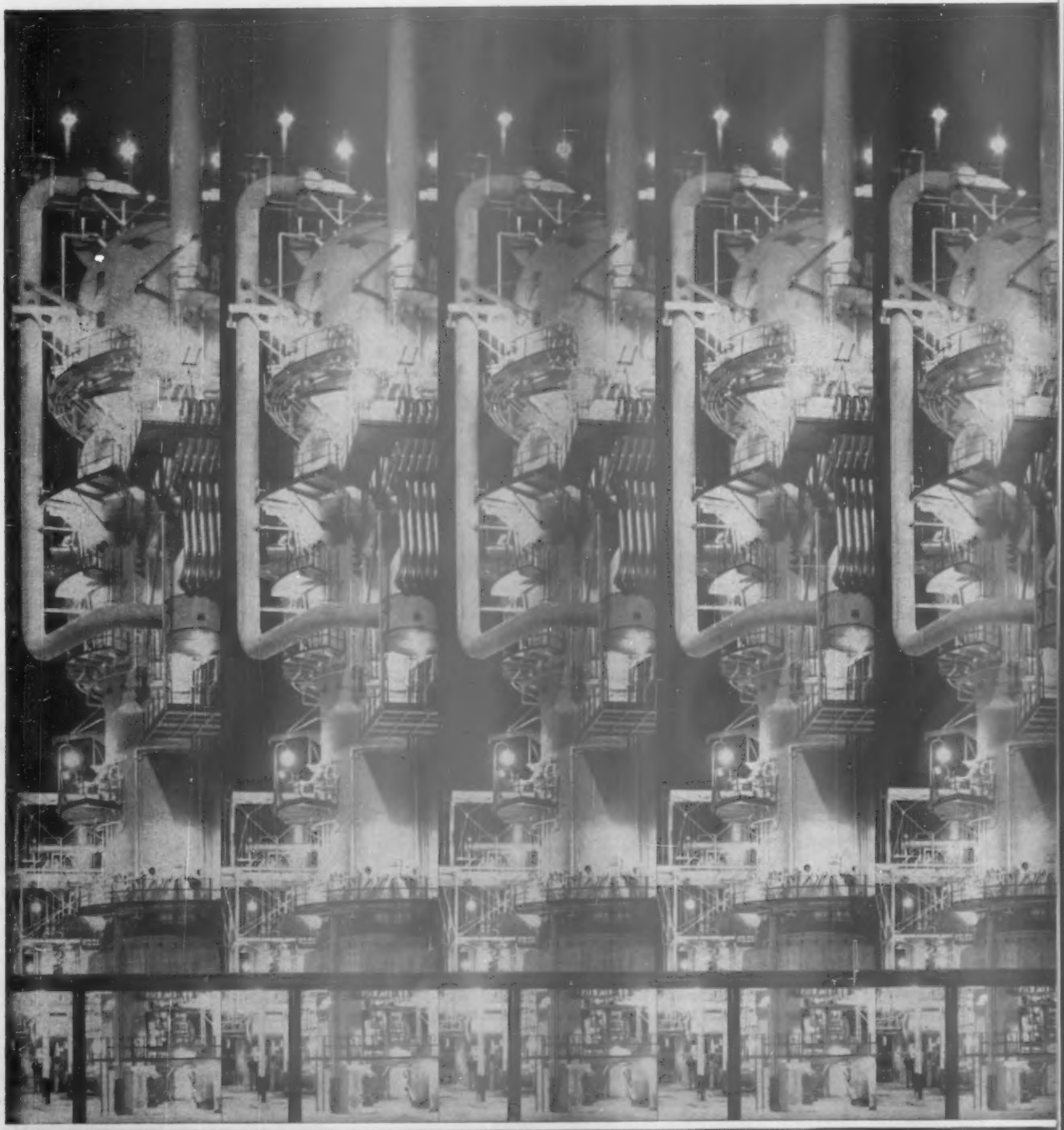
WRITE FOR FOLDER 181-C which gives complete information about all Jenkins Bronze Gates. Jenkins Bros., 100 Park Avenue, New York 17.

JENKINS VALVES

JENKINS SINCE 1864 Jenkins Bros

MOST TRUSTED TRADEMARK IN THE VALVE WORLD

KELLOGG Leads Repeatedly



in Cat Cracking....

EXTENSIVE EXPERIENCE AND IMPROVED DESIGN ASSURE OPTIMUM UNIT FOR ANY NEED...

A substantial portion of today's total fluid catalytic cracking capacity bears the imprint of Kellogg engineering and construction techniques. This unparalleled experience, coupled with improvements in Orthoflow® design, enables Kellogg to provide the optimum unit to meet any need in any part of the Free World.

Kellogg's leadership in cat cracking is based upon a continuing program of design improvement. Both in the company's New York engineering offices and Jersey City laboratories, Kellogg specialists have achieved numerous improvements in product quality and yields while reducing investment, utility, and catalyst costs.

The latest developments in Kellogg's Orthoflow design permit use of greater variety of feedstocks and provide improved product distribution, more operational flexibility, and still higher yields of gasoline and lower yields of coke—all with less capital investment and upkeep than ever before.

Whatever your cat cracking needs . . . modernization . . . expansion . . . completely new facilities . . . Kellogg welcomes the opportunity to discuss how it can work to your economic advantage.

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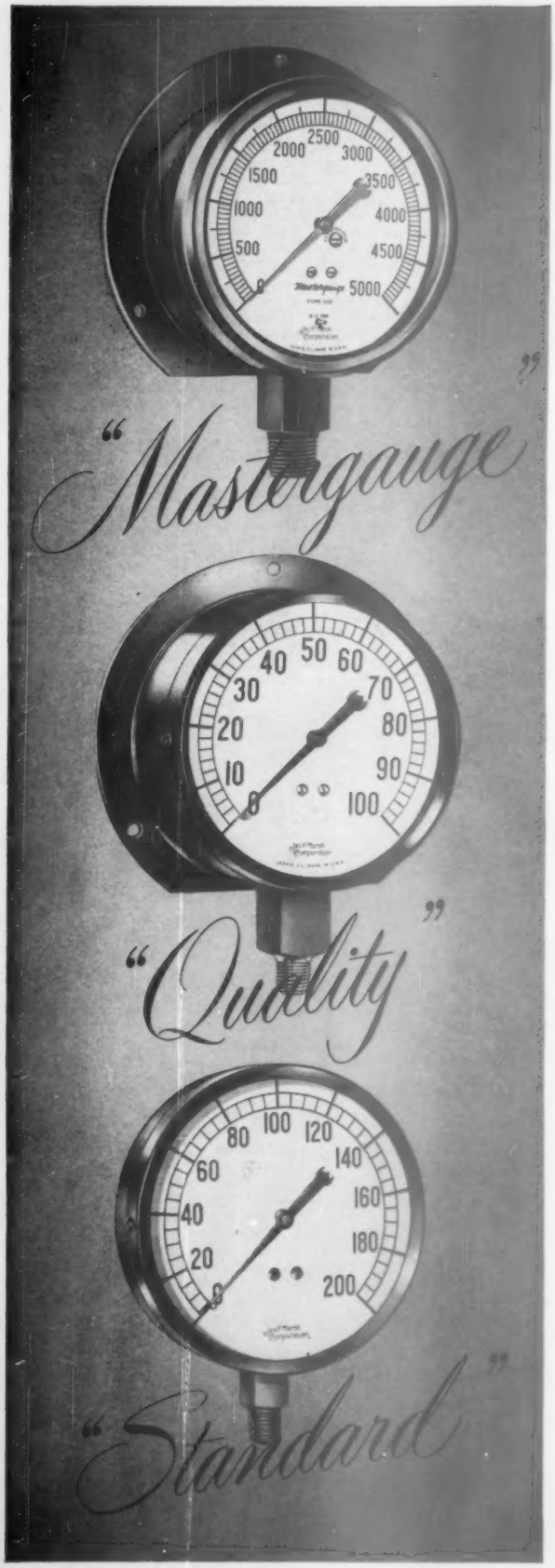
KELLOGG PAN AMERICAN CORPORATION, BUENOS AIRES
COMPANIA KELLOGG de VENEZUELA, CARACAS
COMPANHIA KELLOGG BRASILEIRA, RIO DE JANEIRO

LOCATION	TOTAL THRUPUT BPD
Edmonton, Alberta	3,784
Ponca City, Oklahoma	24,480
Sarnia, Ontario	14,027
Gelsenkirchen, Germany	5,000
Amarillo, Texas	9,706
Sisak, Yugoslavia	3,332
Toledo, Ohio	17,705
Smiths Bluff, Texas	26,625
Philadelphia, Pennsylvania	45,000
Clarkson, Ontario	45,000
Kwinana, Australia	12,500
St. Boniface, Manitoba	9,837
Enid, Oklahoma	19,330
Delaware City, Delaware	101,000
Yorktown, Virginia	30,618
Puerto La Cruz, Venezuela	14,290
Mataripe, Brazil	20,493
Vancouver, British Columbia	13,500
Montevideo, Uruguay	7,000
Concon, Chile	14,400
Mendoza, Argentina	18,783
Borger, Texas	34,830
Texas City, Texas	95,160
Istanbul, Turkey	9,380
Baton Rouge, Louisiana	17,000
Baytown, Texas	14,700
Baton Rouge, Louisiana	15,500
Dominques, California	18,700
Aruba, Netherlands W.I.	15,000
Baltimore, Maryland	15,000
Wood River, Illinois	17,050
Port Arthur, Texas	22,000
Lake Charles, Louisiana	23,400
Parco, Wyoming	9,350
Lake Charles, Louisiana	16,286
Texas City, Texas	17,050
Port Arthur, Texas	17,050
Wood River, Illinois	17,600
Salt Lake City, Utah	14,500
Lake Charles, Louisiana	17,435
Sarnia, Ontario	29,000
Baton Rouge, Louisiana	15,500
Baytown, Texas	15,500
Wood River, Illinois	10,000
Whiting, Indiana	20,000
Wilmington, California	16,275
Dinslaken, Germany	10,000
Philadelphia, Pennsylvania	21,030
Casper, Wyoming	6,000
Whiting, Indiana	67,710
Lockport, Illinois	22,400
Sugar Creek, Missouri	20,000
Heath, Ohio	5,000
Montreal East, Quebec	30,358
Tulsa, Oklahoma	16,200
East Chicago, Indiana	45,500
Casper, Wyoming	8,000
Port Arthur, Texas	90,000
Montreal, Quebec	11,000
Toledo, Ohio	30,635
Eagle Point, New Jersey	33,250
West Tulsa, Oklahoma	19,523
Cincinnati, Ohio	19,375
El Dorado, Kansas	22,810
Montreal East, Quebec	21,588
Lawrenceville, Illinois	35,150
Port Arthur, Texas	67,093
Winnipeg, Manitoba	3,740
Grangemouth, Scotland	13,000
Llandarcy, Wales	17,930
Isle of Grain, England	13,500
Philadelphia, Pennsylvania	63,750
La Plata, Argentina	26,165
Port Arthur, Texas	68,000
Gonfreville, France	31,370
Campana, Argentina	14,040



What pressure gauge for your particular need?

The clear-cut economical answer to your specific gauge problem is right here in the Marsh line. It is here because the Marsh line contains the world's most complete range of gauges in the three broad brackets of gauge applications.

THE "MASTERGAUGE" GROUP...for those extreme services that demand the ultimate in gauge precision, accuracy and stamina.

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While these three brackets run a wide gamut of prices, the difference between them is not so much a matter of *grade* as a matter of *kind* and *purpose*. All gauges in all groups reflect Marsh precision and quality. Collectively they cover practically every conceivable gauge requirement.

The answer is in the catalog...but if you have a special problem let our engineering department work with you to select the most efficient, most economical solution to your problem.

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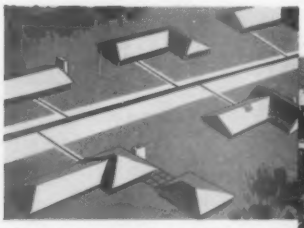
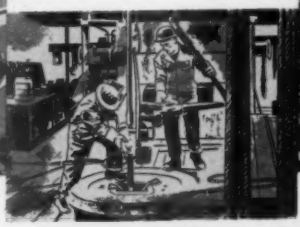
■ High strength . . . quality engineered Southwestern Lightwall saves important dollars when used in place of standard-weight pipe. At Southwestern, a continuous process of improvement upgrades pipe performance . . . in engineering, design, materials and manufacture. Average quality is not good enough—Southwestern demands the best, then finds ways to make that even better.

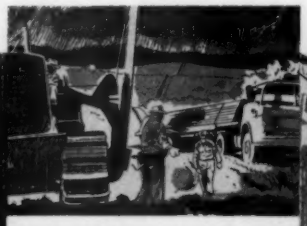
If profit and dependability are important . . . Specify Lightwall by Southwestern.



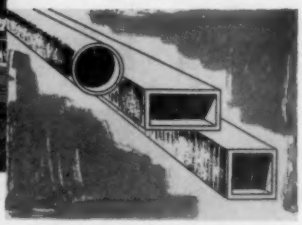
Southwestern Lightwall for mains and laterals in gas distribution systems to homes and industry.



Southwestern integral joint and non-upset E.R.W. oil country tubing for multiple completions and slim-hole drilling.



Southwestern Lightwall line pipe to keep oil and gas on the move in gathering lines—pipelines—waterflood projects.



Southwestern structural pipe and mechanical tubing for a thousand uses in industry, construction, furniture manufacture, fences, metal buildings. Round, rectangular, square and other shapes.

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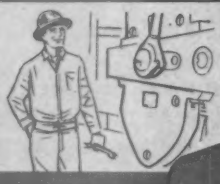

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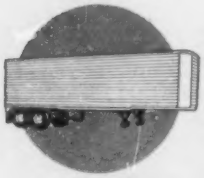
GAS ENGINES



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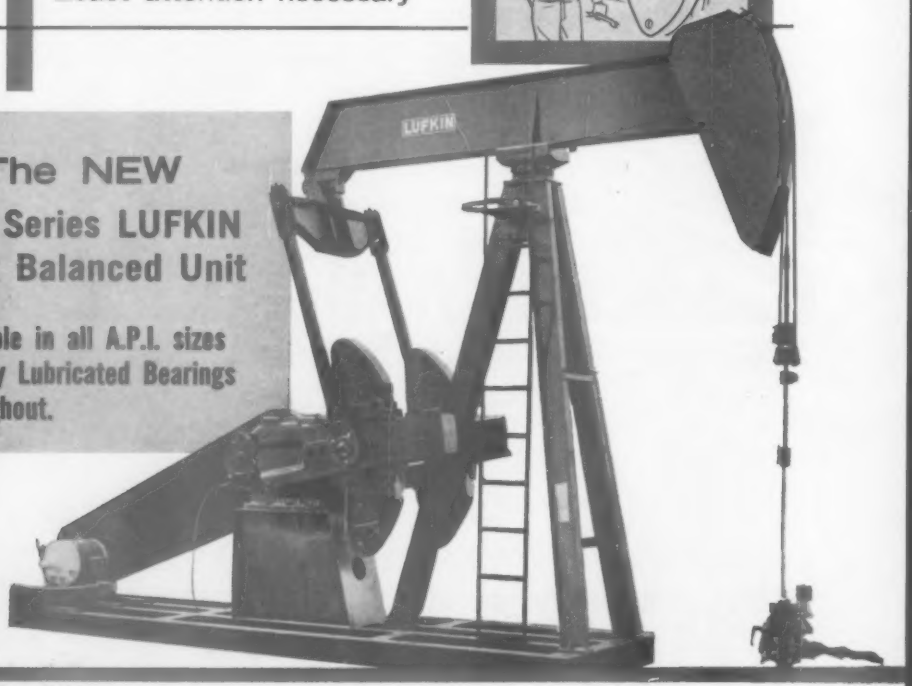

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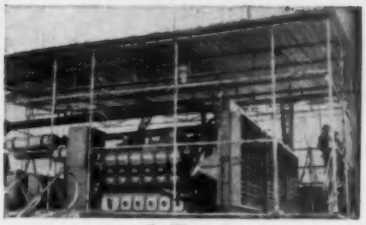
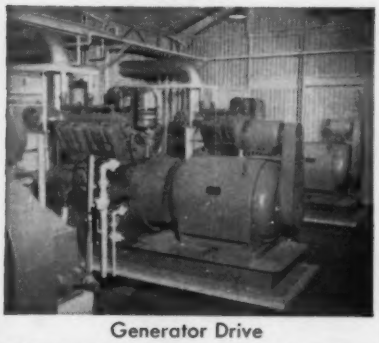
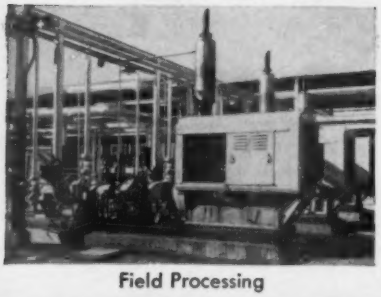


Drilling



Generator Drive

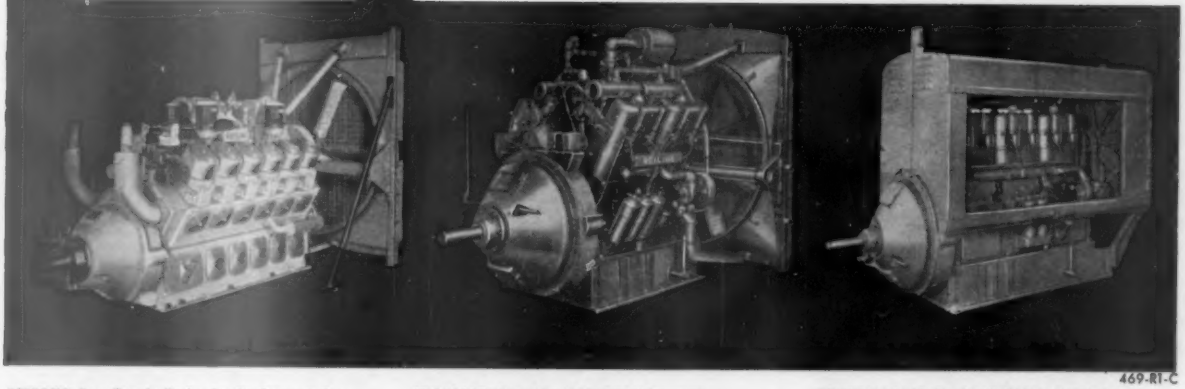
Pipe Line



Field Processing

Repressuring

Transport



469-R1-C

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COLORADO, Denver, Emrick & Hill Engine & Equipt. Co.
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NEW YORK, Syracuse, Schenectady and Lisbon J. C. Georg Corporation
OHIO, Columbus, Cantwell Machinery Company
OKLAHOMA, Oklahoma City and Tulsa Carson Machine & Supply Co.
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TEXAS, Houston, Dallas, San Antonio, Kilgore, Corpus Christi, Beaumont Southern Engine & Pump Co.
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WYOMING, Casper, Emrick & Hill Engine & Equipt. Co.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. / **New York • Tulsa • Huntington Park, Calif.**
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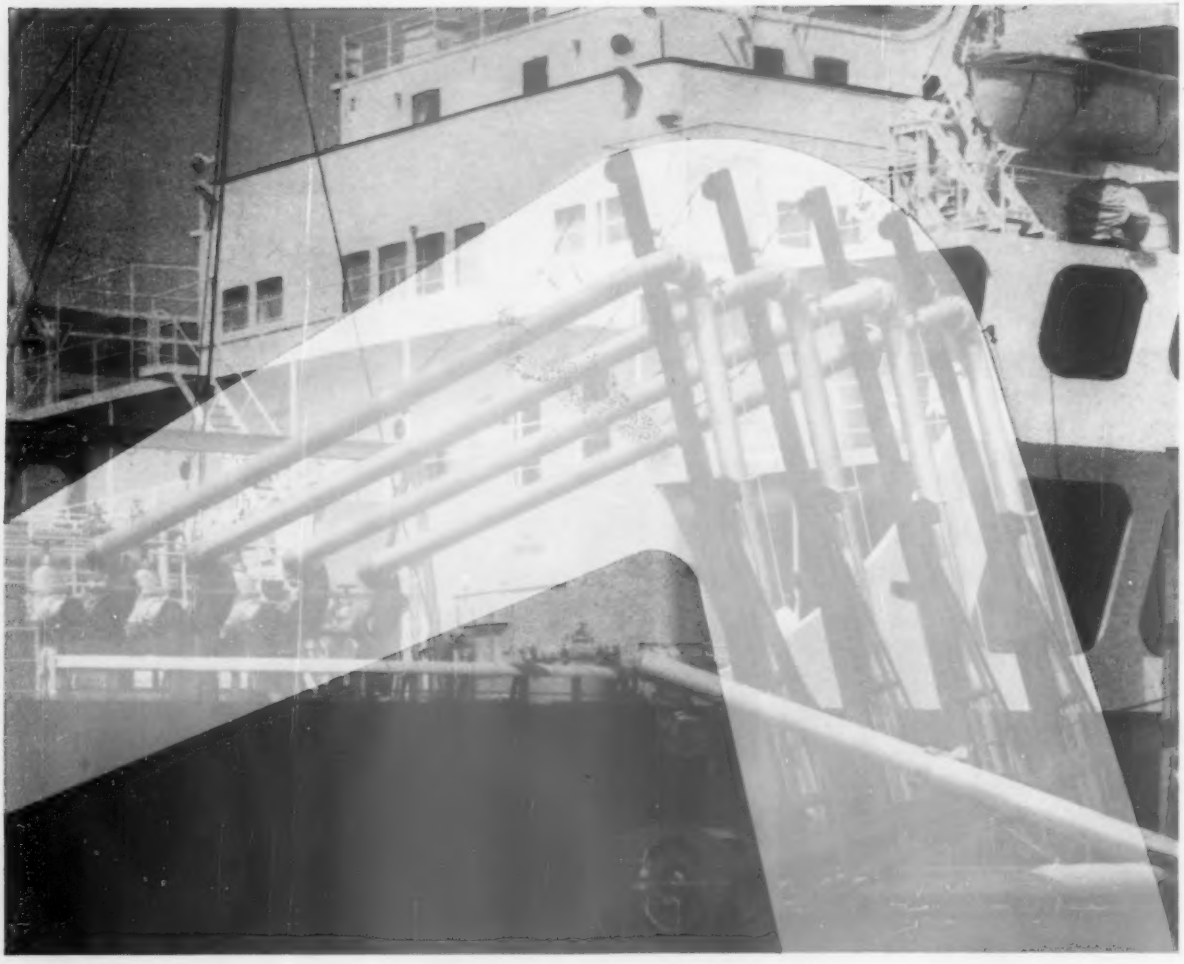

CHIKSAN Hydraulic Marine Loading Arms
PROVED
Safer, Faster, More Economical Way to Load Tankers

More than 260 CHIKSAN Hydraulic Marine Loading Arms in 39 banks are now in service at progressive ports around the world. Since the first CHIKSAN Hydraulic Marine Loading Arm was installed in 1956, there has been no case where a CHIKSAN Arm experienced a design failure. Nor has any arm incorporating CHIKSAN swivel joints failed in service because of the design of the CHIKSAN components.

Made of aluminum and steel, CHIKSAN Arms provide the safety, efficiency and economy of all-metal lines. They reduce fluid cargo handling costs by cutting manpower needs, speeding up loading and unloading, and reducing maintenance and repair costs. Let us send you a free descriptive brochure. Send your name and address to —

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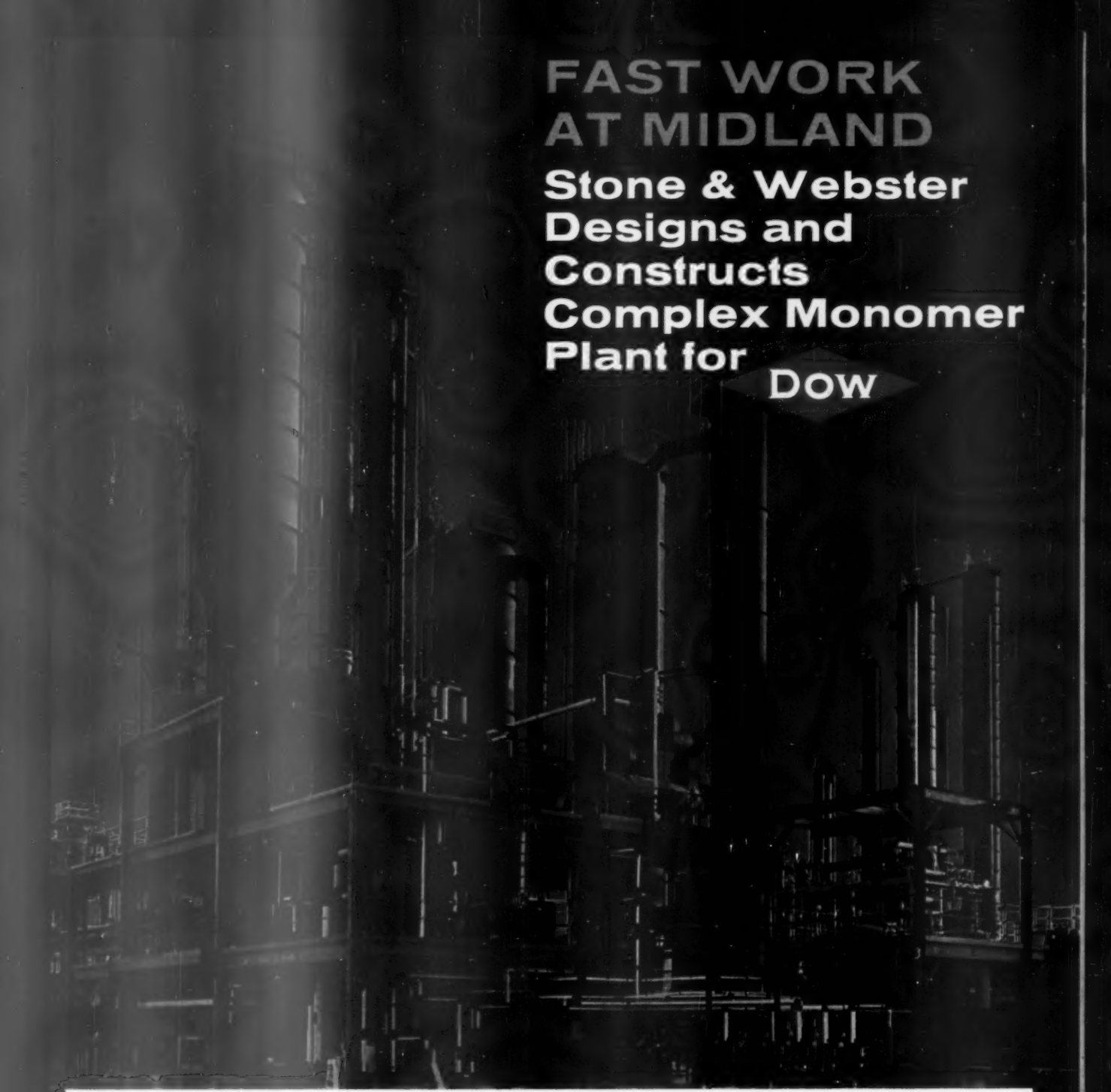
Before you refit your docks, investigate the performance of CHIKSAN Hydraulic Marine Loading Arms at these installations...

Long Beach, California, U.S.A.	5 banks of arms
Hog Island, Pennsylvania, U.S.A.	3 banks
La Salina, Venezuela	4 banks
Puerto La Cruz, Venezuela	1 bank
Sumatra, Indonesia	1 bank
Las Piedras, Venezuela	2 banks
Mina Al Ahmadi, Kuwait	1 bank
Puerto La Miranda, Venezuela	4 banks
Ras Tanura, Saudi Arabia	2 banks
San Pedro, California, U.S.A.	1 bank
Bayway, New Jersey, U.S.A.	1 bank
Baytown, Texas, U.S.A.	2 banks
Kharg Island, Persian Gulf	4 banks
Wakayama, Japan	1 bank
Kawasaki, Japan	1 bank
Kawasaki, Japan	1 bank
Yokohama, Japan	1 bank
Melbourne, Australia	1 bank
Guanabara Bay, Brazil	2 banks
Rotterdam	1 bank



FAST WORK AT MIDLAND

Stone & Webster Designs and Constructs Complex Monomer Plant for DOW

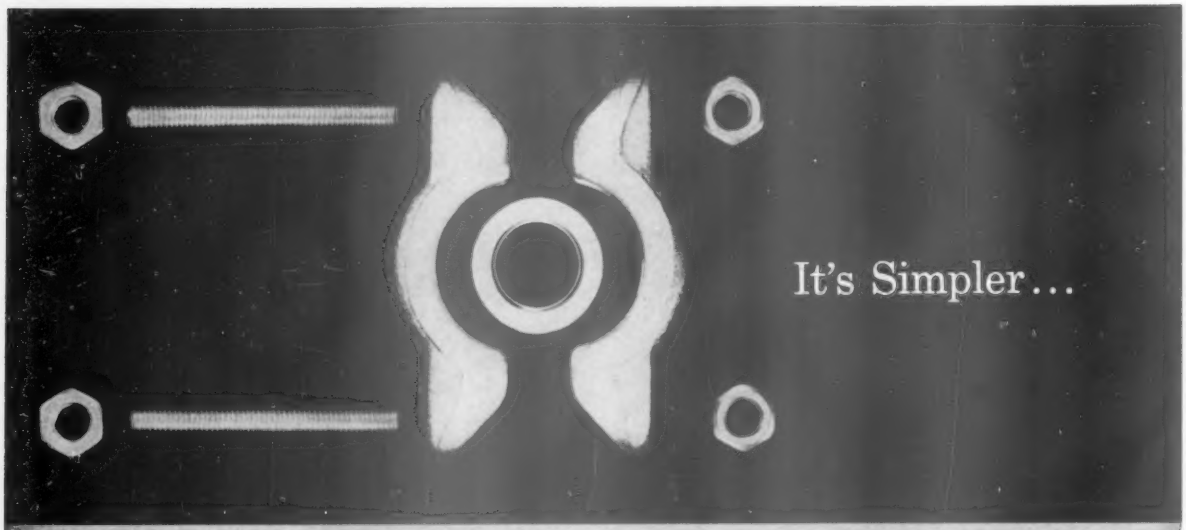
Production began at The Dow Chemical Company's Monomer Plant No. 2 at Midland, Michigan, *within 38 weeks* after the contract for its design and construction was awarded to Stone & Webster Michigan, Inc. Close cooperation with the client's own engineers, plus Stone & Webster's long experience in this field, contributed to the successful completion of the multi-million dollar styrene manufacturing system . . . a project that might ordinarily require a year or more.

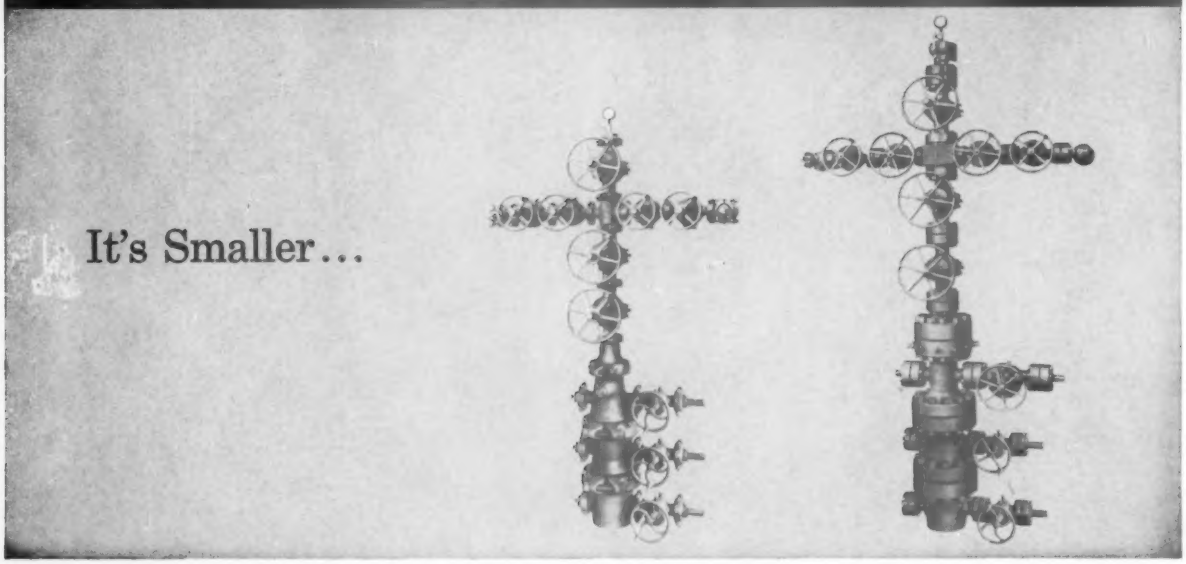
Engineering work began four days after contract signing, while major equipment purchases were completed and piles were being driven eight weeks later. If you have an engineering situation that might benefit from Stone & Webster's ability to get things done, we would like to discuss it with you.

STONE & WEBSTER Engineering Corporation

New York, 90 Broad Street Boston, 49 Federal Street

Chicago Houston San Francisco Los Angeles Seattle Toronto Calgary





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With only two bolts per connection, there's no simpler connection to assemble—and because *Grayloc*® connections require less space, the complete assembly is smaller. Yet for all its simplicity and compactness, *Grayloc* Wellhead Assemblies have been used on the highest pressure wells thus far discovered.

Grayloc connected assemblies are faster and easier to install, weigh less and are less expensive than equally rated flanged assemblies. They resist vibration and retain a tight seal after original assembly without further attention.

A Gray representative will be glad to show you how much better *Grayloc* connected wellhead assemblies can work for you. Write today for additional information and the Gray catalog.

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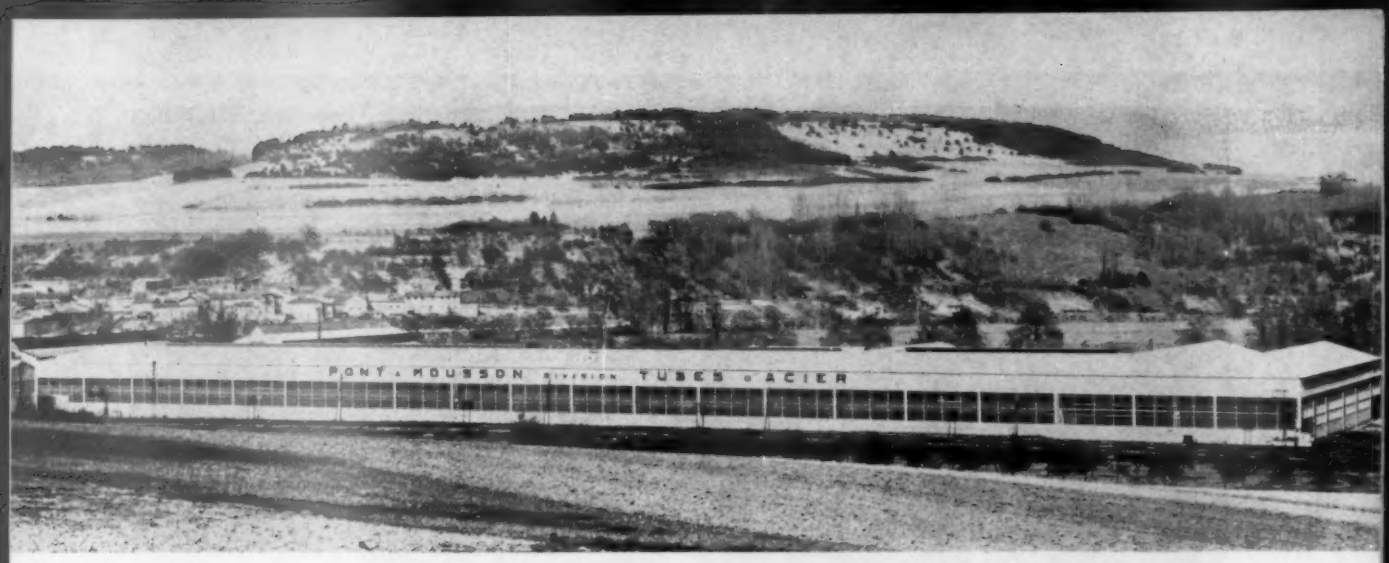


General panorama of the Belleville mill of Pont-a-Mousson.

French Steel Pipe Industry Expands To Meet North African Needs

The booming French steel pipe industry, already taking giant strides as the Sahara yields new oil potential, got new impetus in spite of the recent North African crisis.

Following the outbreak of violence in Bizerte in July, the Tunisian government cut the oil flow from Edjeleh. In response, French petroleum interests decided immediately to construct a new pipe line connecting the C.R.E.P.S. eastern Sahara fields with the existing pipe lines that run through Chanet and Hassi-Messaoud, and thence to the Mediterranean.

The project had been on the drawing board, but scheduled for the indefinite future. The Tunisian flare-up, within the span of a few hours, brought the decision to get the work under way without delay.

Urgent orders were placed in early September with the Belleville Plant of the Société des Fonderies de Pont-a-Mousson, a major French pipe and tube manufacturer which, at this time was supplying pipe for the eastern European pipeline complex "Lavera-Strasbourg".

The firm's production team were asked if the short delivery dates for the huge order could be met. Back came the response: "Can do!" This confident answer is typical of the production power and resources of the steadily growing French steel pipe industry. For example, the Belleville plant which makes welded pipe is but one division of the Société des Fonderies de Pont-a-Mousson. Internationally known, Pont-a-Mousson is a major holding Company with extensive interests in coal mining, steel mill and pipe founderies, in addition directs pipe-laying and construction companies in 15 other countries. Its specialization in steel pipe and tube manufacture and construction has won it a special international recognition as a major supplier of facilities for volume transport of petroleum and gas by pipeline.

In the Common Market, Pont-a-Mousson controls the HADIR Company which manufactures small diameter welded pipes in Luxembourg; in Germany, the Halberghütte Company for oil pumps and compressors; in France and in the oil and gas fields, PONT-A-MOUSSON directs—through its subsidiary SIDELOR—, the seamless steel-pipe plant at Déville-les-Rouen, the most modern mill in Europe. This plant manufactures all sizes of seamless steel pipes from ⅓″ to 10¾″ in all grades of steel recog-

Precise quality control by the specific identity card which follows each tube through the production line and on which is noted specifications and control test data.

nized by the American Petroleum Institute. Ductile iron pipes, used by a majority of French Tanker fleet, were first manufactured in Europe by the PONT-A-MOUSSON complex. In welded pipe the production line at the Société des Fonderies in Belleville provides tubes from 16 to 42″, generally in X 52 steel, and also in other grades of steel if necessary.

Belleville additionally finds itself working with many special orders. For example, boiler pipes with diameters up to ten feet.

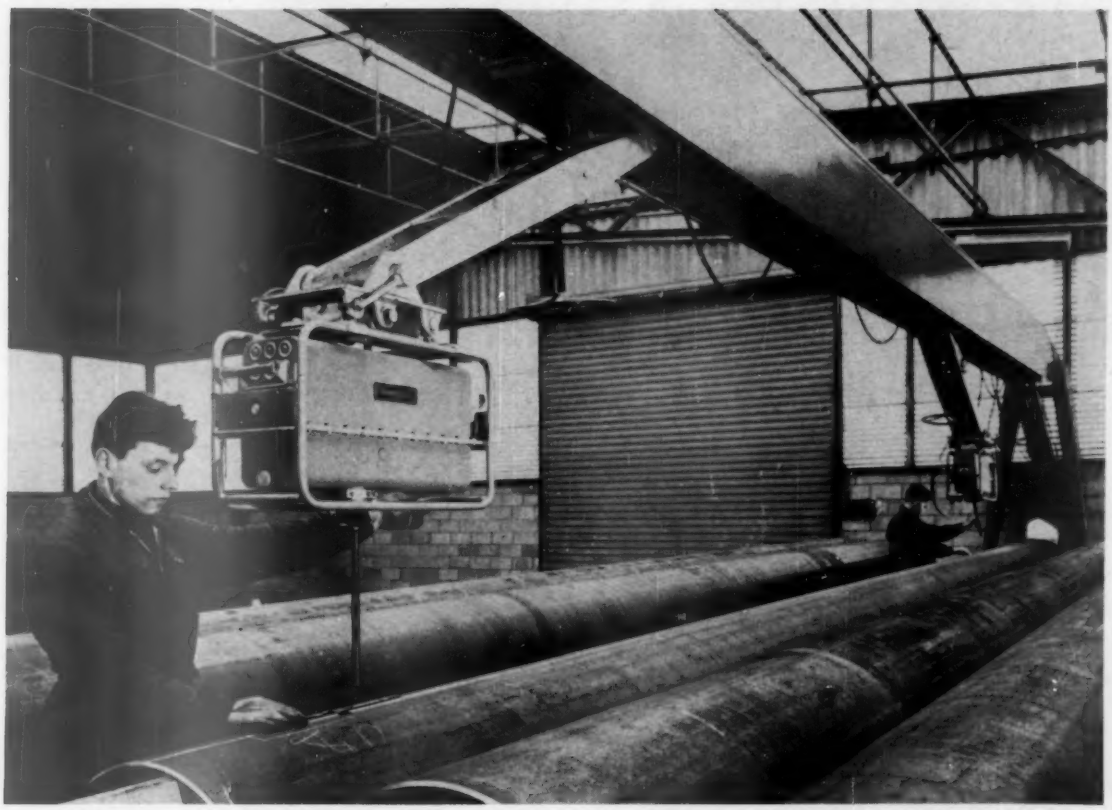
The plant at Déville-les-Rouen for seamless steel pipes is modelled after American prototypes. However, the Belleville mill follows the successful patterns established in other Pont-a-Mousson plants in Europe.

The plant's modern Research Center guided the selection of the special steel for the cross-Mediterranean pipeline. A major pipe-laying Company of the Group: EAU et ASSAINISSEMENT—SOCOMAN is closely studying applications in this particular field.

Of necessity, much production equipment on the pipe production line at Belleville is originally designed. It employes a high degree of automation and the long steel plates are folded,

New testing methods utilizing advanced ultra-sonic techniques are applied for the second time to welding points prior to final X-Ray control.

(ADVERTISEMENT)



All the ends of the tubes are systematically submitted to a radiographic control • Together with the possibly suspect spots detected with the aid of an ultra-sonic gauge.

curved into a "C" shape then pressed in the final "O" before welding with remarkable facility. The inner welding is controlled on a TV screen filmed by the camera's lens at the welding head. Outside welding is done under the guidance of a light signal, also with automatic ease. Both ends of the tube are then cut with a blow torch and then hydraulically expanded into final shape. The final operation—end facing and bevelling—follows and a pipe is born.

The plant is equipped to provide the various protective coating processes, inner and outside, to customer specifications. Unusual mechanical and boiler shaping equipment are also part of the plant's facilities. Rigid inspections afford good quality control, and out of one 60-employee shift, as example, 18 persons are engaged in quality control operations. Inspectors wear green uniforms to distinguish them from the production men wearing blue. Total output of this one 60-man crew per shift is roughly one mile of steel tubes. Each control point finds several inspectors who select tubes at random from each run of 50 tubes. These samples undergo a rigorous pattern of tests designed to confirm tensile strength, welding efficiency and the stress placed on the metal by the folding and blending operations. These tubes are, of course, deleted from the production run, but serve their purpose in affording constant spot check of the production run.

On reaching the inspection shop, the steel plate is subjected to a wide range of tests: ultrasonic, various and special measurements. The tube is identified, marked and then gets its "identification card" which stays with it right up to finishing point.

Following the welding operation, the tube again undergoes ultra-sonic examination. Even slight faults call for an X-Ray and eventual return for semi-automatic repair. The final test during production is hydrostatic pressure control, following expansion of the tubes according to A.P.I. specifications.

M. PIERSON, Plant Alternate Manager states that "It is barely possible that a defective tube might leave our plant, but hardly probable."

Even after the tube is finished, another series of inspection operations begins: the ultra-sonic welding test, using still more sensitive testing equipment, then systematic X-Rays for **all** tubes and, finally, special testing of doubtful spots disclosed during ultra-sonic tests. Dimensional in-

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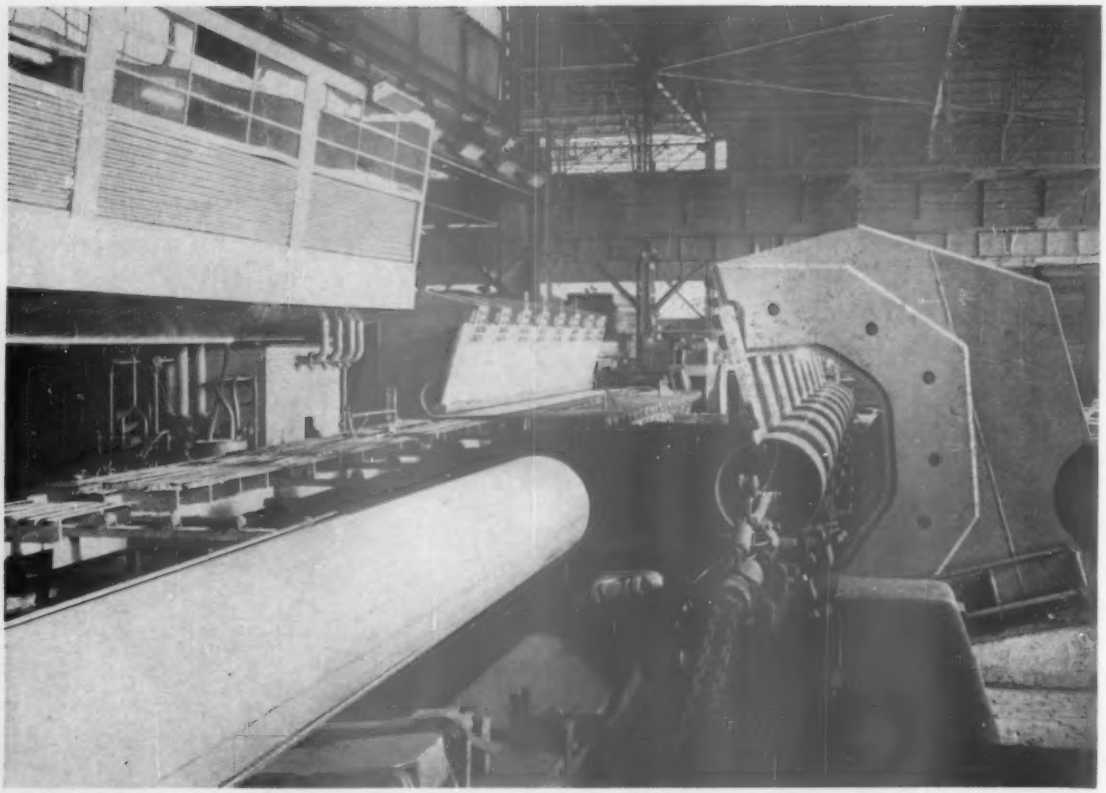

Automation guides the shaping and bending of flat steel plates into circular tubes ready to weld. The "C" shaping operation (center rear) preceeds the final "O" shaping operation at the right (16 to 42")

spection also takes place before delivery of the tube.

"As a matter of fact, the Official A.P.I. certificate which hangs in my office is a continuing challenge to us not only to meet the basic approved API standards, but also to surpass them in many cases".

These strict control standards have paid off, and have won the respect of foreign competitors. "American or Russian Technicians who visited our plant have been greatly impressed by the extent and quality of our controls" adds Plant Manager, Monsieur SOGNET.

Mr. CLEMENTZ, a Director of the SOCIETE des FONDERIES de PONT-A-MOUSSON said also: "We try to keep inspection measures at peak efficiency. Perhaps as a result our tubes are found on all lines constructed in the Sahara and in France since 1957, when our production first started. Also, and this is equally important, we keep our prices competitive.

As an important link in the chain of Companies involved in pipe work productions under the PONT-A-MOUSSON Label, the welded pipe plant at Belleville should play a major role in the petroleum and gas industry. Indeed, we are awaiting a considerable expansion of pipe transportations especially in the oil, gas and raw and finished product catergories."

PONT-A-MOUSSON

MAIN OFFICES

PARIS, 24, rue, de Prony (17e) • NEW YORK, Pontex Pipe Corp., 116 John Street • Suite 1317, New York 38, N. Y. • SAO PAULO, Rua Marconi 131 (7° andar) • MEXICO D.F., Apartado 1 014 Monterrey 29 • BUENOS AIRES, Calle Peru 263, 7° Piso • BEYROUTH, P.O.B. 3359 • BANGKOK, P.O.B. 280

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drop-tight shutoff
maximum seat life
easy operation

Darling-Pelton Butterfly Valves have a continuous 360° rubber sealing ring, uninterrupted by the valve shaft, that makes complete drop-tight shutoff possible. The valve disc, swinging on an axis eccentric to the valve centerline, is exceptionally easy to operate. It lifts away from the body seat on opening to eliminate any abrasion or distortion. The rubber seat can be replaced quickly without dismantling the valve. *You can depend on* Darling-Pelton Butterfly Valves for safety, long service, superior performance.

Write, wire or phone for your copy of Bulletin 5904 giving complete information on these butterfly valves made to A.W.W.A. Specifications.

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The Canada Valve & Hydrant Co., Ltd., Brantford 7, Ontario, Canada
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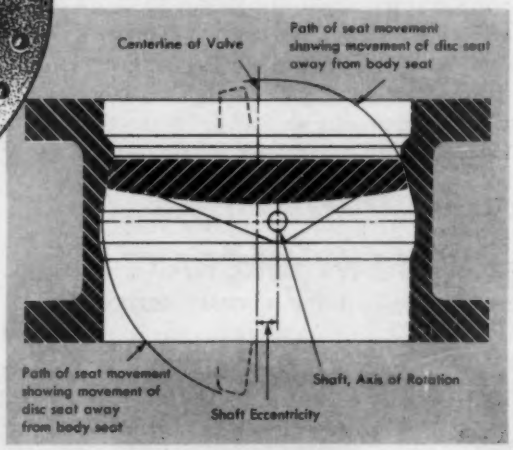
Exaggerated diagram showing eccentricity of valve shaft in relation to valve axis and how the disc, upon opening, is lifted from the body seat throughout its entire circumference.


Centerline of Valve
Path of seat movement showing movement of disc seat away from body seat
Path of seat movement showing movement of disc seat away from body seat
Shaft Eccentricity
Shaft, Axis of Rotation

Get your pipe stringing investment out of the mud

Nothing bogs down men and machines on a pipe stringing job like old man mud . . . especially when heavy equipment churns the stuff into a thick batter. To side-step the mud and leave a workable right of way for the pipe gang, a Sikorsky helicopter was used by Petroleum Helicopters, Inc. to string some of the pipe for the Trunkline Gas Company in Texas. Not only were the crews able to work more easily and faster because they were not hampered by as much mud, but the helicopter also made it possible to complete the job days ahead of schedule at the substantial saving of about 30 cents a foot. Why not put your investment where it won't get slowed down, where it can move ahead and produce faster results for you. Find out the interesting facts about using or owning a Sikorsky helicopter. It can cut the time and cost of stringing pipe, of setting river weights in swampy areas, and of other lifting and trucking operations. Write today for all details.

SIKORSKY AIRCRAFT Stratford, Connecticut
Division of **UNITED AIRCRAFT CORPORATION**

Nash Compressors Tame "Hard-to-handle" Corrosive Gases

The reasons for the success of Nash Compressors in handling "dirty" and corrosive gases are simple. First, Nash Compressors have no internal parts in wearing contact, or requiring close tolerances and internal lubrication. Second, because of the Nash operating principle, a variety of liquids can be employed as the compressant medium, protecting the interior from corrosive action. Third, the pump casing may be fabricated from a variety of special metals and alloys. That is why Nash Compressors take these rugged jobs in stride.

Nash Vacuum Pumps offer the same basic advantages when handling corrosive gases, and reliably maintain vacuums up to 29.50 inches of mercury.

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AMMONIA
ARGON
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CARBON DIOXIDE
CARBON MONOXIDE
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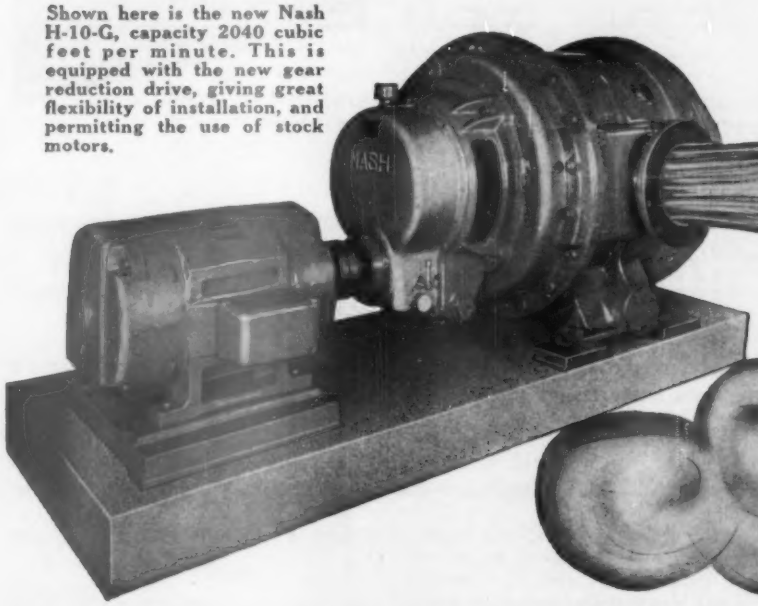
ETHYL CHLORIDE
FLUE GAS
FURFURAL
HEXANE
HELIUM
HYDROGEN
HYDROGEN SULPHIDE
NITROGEN
OXYGEN
PHOSPHOROUS PENTOXIDE
SULPHUR GAS
VINYL ACETATE
VINYL CHLORIDE
AND MANY OTHERS

Shown here is the new Nash H-10-G, capacity 2040 cubic feet per minute. This is equipped with the new gear reduction drive, giving great flexibility of installation, and permitting the use of stock motors.

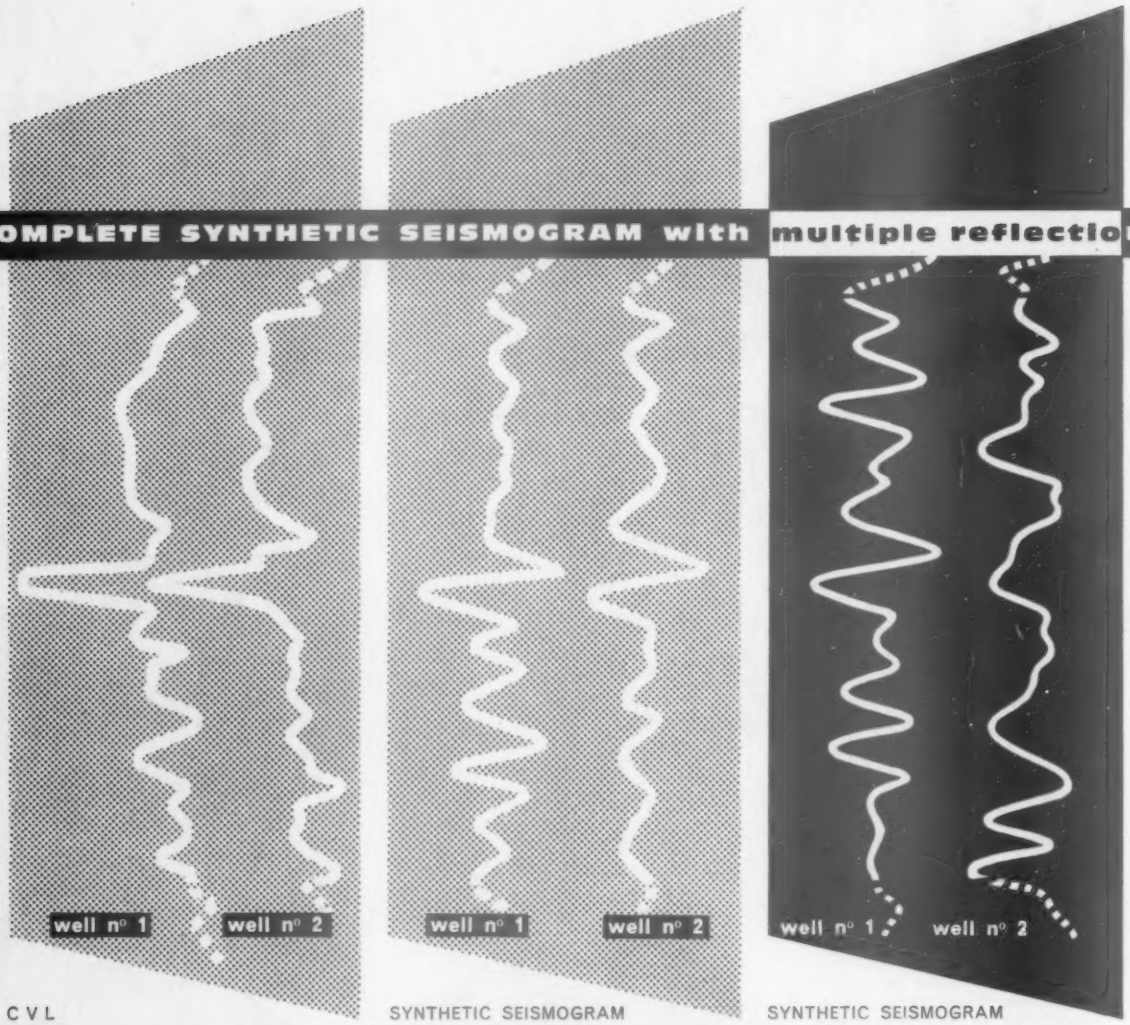


NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

A NEW METHOD OF IMPROVING THE PRESENTATION AND THE INTERPRETATION OF SEISMIC RECORDS

THE COMPLETE SYNTHETIC SEISMOGRAM with multiple reflections



C V L

SYNTHETIC SEISMOGRAM WITHOUT MULTIPLES

SYNTHETIC SEISMOGRAM WITH MULTIPLES

What geological and geophysical information can be obtained after synthetic seismograms are examined and are compared with the actual records ?

The synthetic seismograms make it possible to ascertain the existence and the quality of the horizons which may be used as good markers

The synthetic seismogram leads to improvements of the field techniques: automatic gain control and filtering

The synthetic seismograms are conducive to a more complete and more acurate interpretation

Using the synthetic seismogram your past and present surveys can attain their full value

The cost of a synthetic seismogram with multiple reflections varies with the depth logged : 20 to 25 % of the cost of the logging operations proper

For a borehole of average depth, this cost is no higher than that of one kilometer of seismic profile

YOU TOO WILL BENEFIT FROM THE USE OF THIS NEW GEOPHYSICAL TOOL

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Peerless Integrated Design

CAN CUT YOUR PUMP INVENTORY COSTS AS MUCH AS 85%

Maximum interchangeability means far fewer parts required to fill all your day-to-day needs.

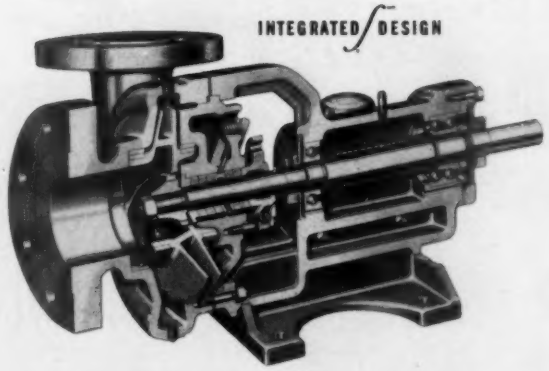
The effectiveness of integrated design of Peerless Type DL and DM process pumps can probably best be shown by a recent customer's order. This customer purchased 150 process pumps for his plant. Of the group, 120 have interchangeable parts. As a result, pump inventory of spare parts can now be cut to a fraction of former requirements freeing important dollars for many other uses. And with the greater interchangeability, the customer predicts even more savings because of speedier maintenance work and less time lost waiting for proper parts.

And, if interchangeability of Peerless Type DL and DM pumps captures your interest, please remember this fact. Because Type DL and DM pumps are of integrated design, you can order them out of stock just the way you need them. For example, there is a choice of semi-open or enclosed impellers; water or air cooled backplates; oil or grease lube bearing housing; packing or mechanical seals; and liquid ends of any machineable metal.

There is one more point to be told about these pumps. They are real performers. Proven time after time, they efficiently pump virtually all liquids used in the process industries.

INTEGRATED ∫ DESIGN FOR GREATER EFFICIENCY AND SAVINGS

PEERLESS PUMPS



VERSATILE IS THE WORD FOR THIS PEERLESS DL—DM PROCESS PUMP

The Peerless Type DL and Type DM process pumps will handle virtually all liquids used in the chemical, process and refining industries. Both models are single stage, single suction centrifugal types with a vertically split case, and both models have capacities to 1000 gpm, heads to 430 feet and working pressures to 300 psig. Type DL models have a temperature range of 250°F, while the Type DM models have a range of 450°F.

FOR EXAMPLE: WITHIN FIVE DIFFERENT SIZE PUMPS THESE 22 PARTS ARE INTERCHANGEABLE—

1. Shaft
2. Back plate
3. Packing rings
4. Radial bearing
5. Packing gland
6. Thrust bearing
7. Pump frame
8. Impeller lock nut
9. Bearing lock nut
10. Seal lantern packing
11. Key
12. Thrust plate
13. Water slinger & set screw
14. Lockwasher-bearing
15. Gasket-volute case
16. Gasket-thrust plate
17. Oil retainer plate
18. Oiler: constant level
19. Lockwasher-impeller
20. Gland clamp
21. Splash plate
22. Retaining ring bearing

Putting Ideas to Work

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

Peerless Pump HYDRODYNAMICS DIVISION

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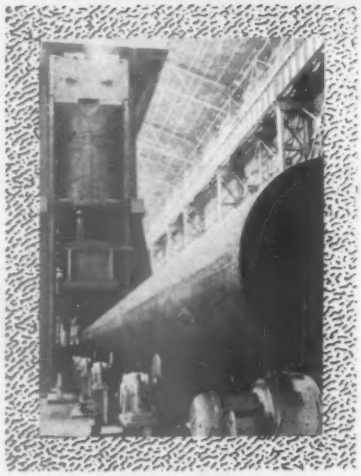

NKK

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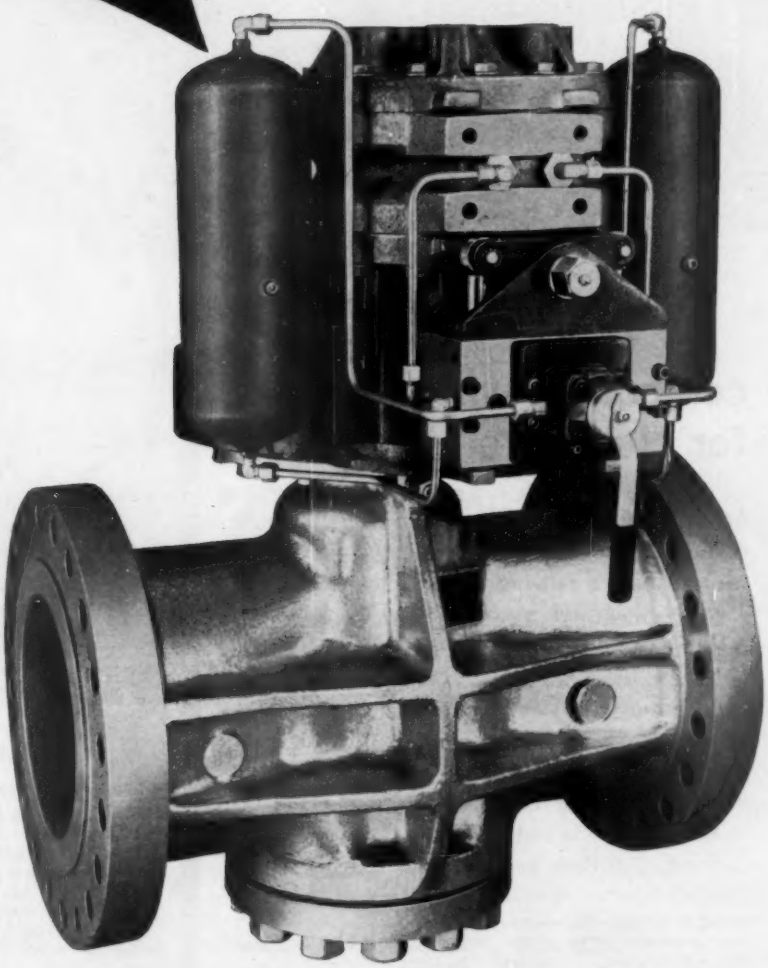
LimiTorque INTRODUCES.....the new type "G" series GAS-HYDRAULIC OPERATORS for plug valves of any size

SIMPLE • RELIABLE • ECONOMICAL • FAST • SMOOTH OPERATION • DELIVERS TORQUE "WITHOUT SHOCK," THROUGH ONLY ONE MOVING PART



These operators have oscillating vane type Hydraulic motors, applying power directly to the plug valve stem—they can be mounted in any position, and are designed to eliminate the usual gearing found on plug valves.

The new LimiTorque type "G" operators are designed primarily for utilization of gas pressure from the pipe line on which they are installed; however, they can be operated by air or liquids from other pressure sources —with or without accumulators.

For pressure operation, the units are equipped with a shear-seal type directional control valve having three positions: Valve open, valve closed, and neutral. For manual operation, the units operate through a specially designed hand pump mounted on the side of the vane motor. The type "G" units can be easily mounted on the plug valve, and because they are directly centered over the shaft . . . It is not necessary to remove the valve from service in order to install the type "G" unit. No maintenance is required with these operators, and it is not necessary to check the level of oil in the accumulation tanks, as this is taken care of automatically.

For complete information, contact your valve manufacturer, or your nearest LimiTorque Sales Engineering Office.

Write for Bulletin 7A-60

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compatible with additives for slurry weight control

Another field report proves Unaflo oil-well cement compatible with additives for light- or heavy-weight slurries ranging from 12 to 19 lbs./gal.

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For more information, write Universal Atlas Cement, 100 Park Avenue, New York 17, N. Y.

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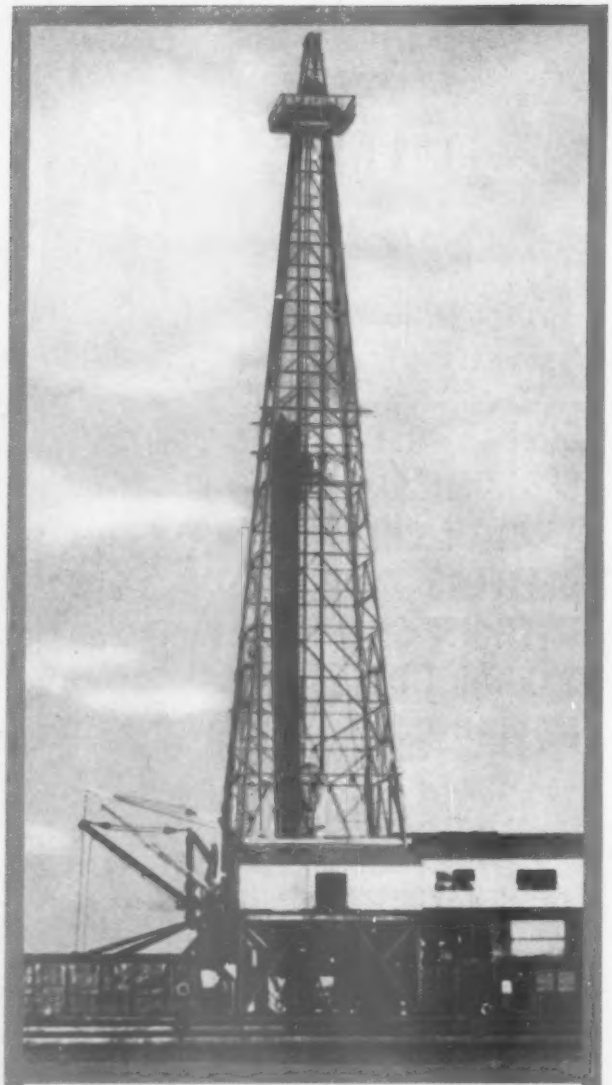
Universal Atlas Cement
Division of
United States Steel



U-196

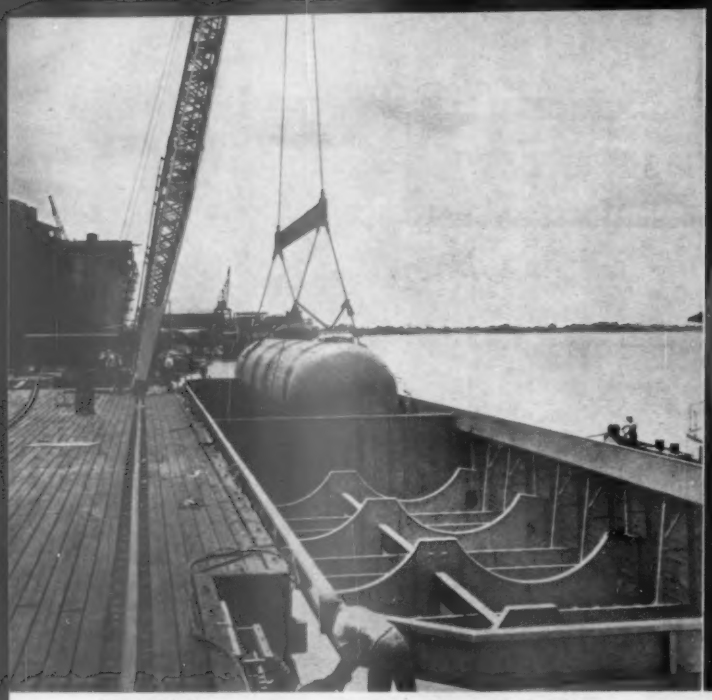
CEMENTING DATA

Contractor: Rowan Drilling Co., Inc., Ft. Worth, Texas

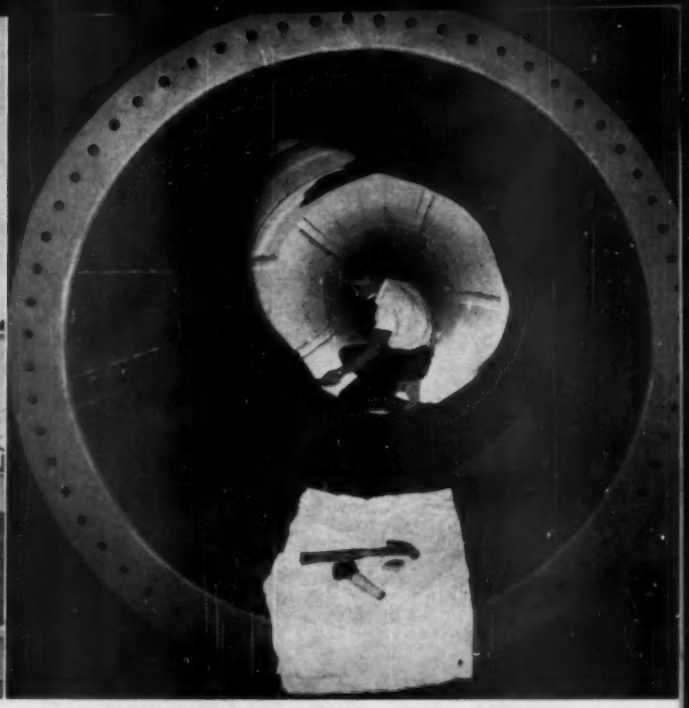
Job #1 – String of 9⅝" O.D. -N80 and P110 casing run in a 12¼" hole to 14,095', cemented with 1,500 cu. ft. of lt. wt. slurry composition (811 sacks UNAFLO plus 406 cu. ft. Stratacrete 6 plus 4% gel by weight of cement). Slurry wt. 13.3 lbs./gal. Drilling mud wt. 11.8 lbs./gal Log temp. 216°F. Est. static BHT 248°F. Final pressure 2,000 psi. Full returns accomplished during 1 hr. and 40 minutes mixing and pumping of the slurry to place behind the pipe.

Job #2 – Drilling 8⅜" hole below 9⅝" casing at 14,483' using 17.9 mud, well started losing mud and kicking. Retrievable-type packer set in the 9⅝" casing at 14,006' and the open hole was squeezed using 1,000 sacks of UNAFLO plus .3 of 1% HR4 Retarder. Max. squeeze pressure of 5,200 psi resulted with 825 sacks out in the formation. Mixing and pumping time 2 hrs. and 7 minutes. Est. static BHT 276°F.

Job #3 – 856' of 6⅝" O.D. P110 liner bottomed at 14,895', cemented with 250 cu. ft. of a weighted slurry composition consisting of 205 sacks UNAFLO cement plus 8,000 lbs. Ilmenite Ore plus .3 of 1% HR4 by weight of cement. Drilling mud weight 18.5 lb. gal. Log. temp. 245°F. Est. static BHT 282°F. Full returns accomplished during 55 minutes mixing and pumping of the slurry.



165,000 gallon capacity cargo tank being lowered into saddles in petrochemical barge hull. Lifting device (partly shown) has 600 ton capacity.



Rubber lining being applied to unit of a chlorine system. Flow meters, valves and tanks are lined with speed and efficiency. Avondale is the authorized U.S. Rubber Co. applicator for N.W. Fla., Ala., Miss., S.W. Tenn., Ark., and La.

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From giant tank carrier barges to the smallest anticorrosive rubber lining job, Avondale builds and delivers the machinery of petrochemistry. Specialized engineering ability, shop facilities and fabrication skills assure custom construction to *your* specifications—Avondale is continuously aware of the special requirements of the petrochemical industry. And Avondale's strategic location permits fast delivery by truck, rail or barge.

Contact Avondale today about your next project. Use our skills and ability to *your* advantage.

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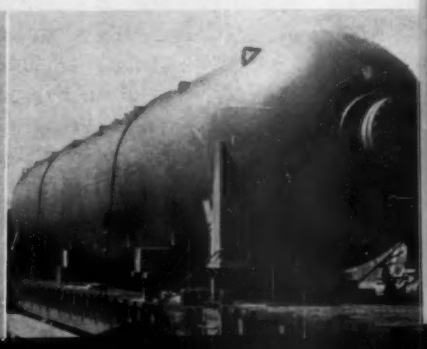
Weather and corrosion-resistant fire hose house. The Avoncraft Division produces these and other porcelain enamel on steel products including lagging and buildings of all descriptions.

Ethylene storage tank for a large chemical company, shipped by rail. Avondale fabricates pressure vessels and storage tanks in the Main Yard, the strategic location of which permits delivery by truck, rail or barge.



DIAMOND "FIRSTS"

in the development of Roller Chain

FIRST TO PRE-LOAD PRODUCTION ROLLER CHAIN

Pre-loading seats pins, bushings and linkplates; takes out initial stretch.

FIRST TO STUDY FATIGUE

First to make design changes in roller chain parts for improved fatigue resistance.

FIRST TO BALL DRIFT

Pitch holes in DIAMOND chain sideplates are ball drifted for greater fatigue resistance—(DIAMOND patent).

FIRST TO EMPLOY SEAM RELIEF BUSHINGS

OIL RESERVOIR

Seam relief bushings in roller chain reduce run-in time and provide better lubrication—(DIAMOND original patent).

FIRST TO PROPERLY PLACE BUSHINGS

Bushing seams on DIAMOND roller chain are always placed *away* from load-bearing area for improved resistance to wear and fatigue.

FIRST TO SHOT PEEN

DIAMOND chain parts . . . rollers, bushings, linkplates and pins . . . are shot peened for greater fatigue resistance.

DIAMOND Roller Chains are the product of more than seventy-one years of specialization in the manufacture of high endurance roller chain. Some of the quality features developed and pioneered by DIAMOND are considered "extra" or "premium" features in other chains. These are standard in DIAMOND Roller Chains . . . and have been for years. DIAMOND will continue to improve the capabilities of its product, assuring you *always* of a thoroughly dependable chain with superior operating characteristics.

DIAMOND CHAIN COMPANY, INC.

A Subsidiary of American Steel Foundries

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STAY
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power for:

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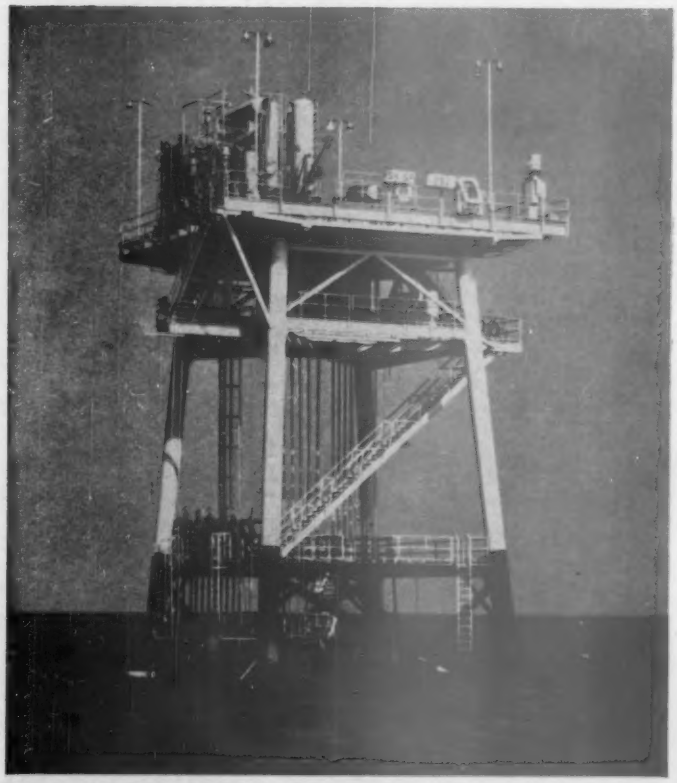

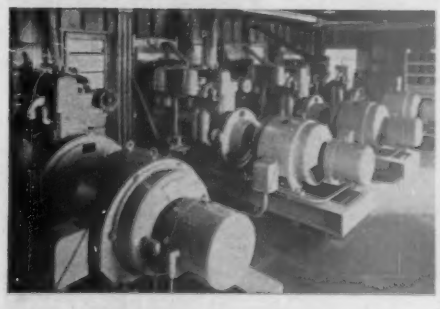

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10 to 1235 hp
BOTH DIESELS AND "BUILT-FOR-GAS" ENGINES

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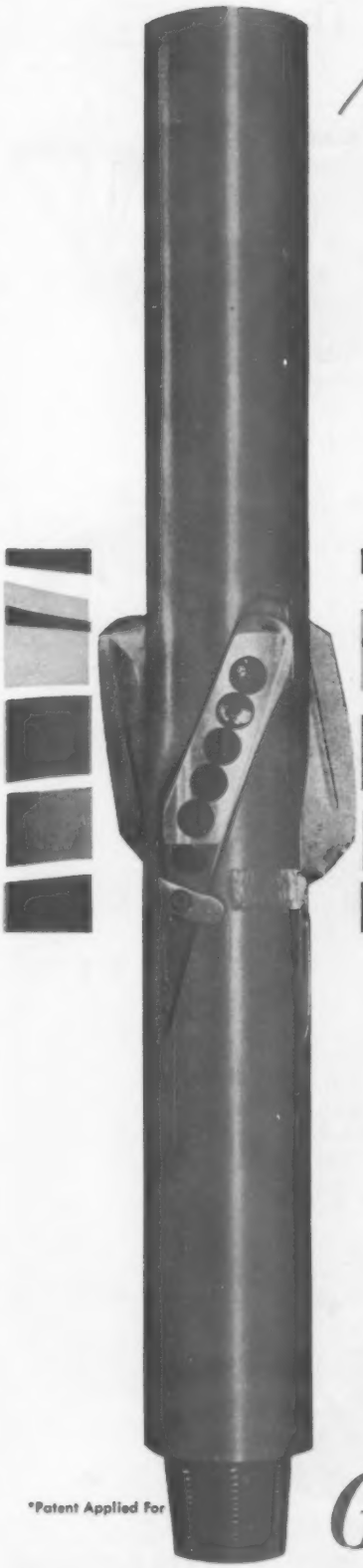
Factories: Waukesha, Wis.; Clinton, Iowa; Houston, Texas



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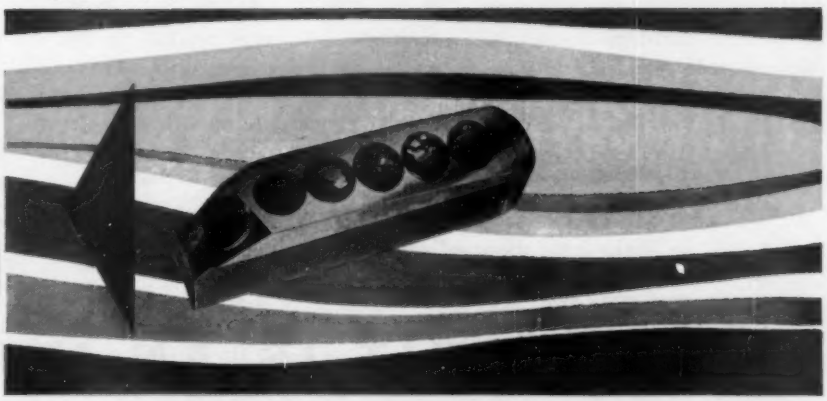
Now—to the *economy* of drill string stabilization with Grant detachable blade stabilizers—you can add *greater safety than ever before.*



Grant's entirely new concept in blade design is this all-new Button Drilblade* of forged and heat-treated aluminum with press-fitted, individually hard-faced, mild steel inserts. ***It cannot break off or come loose in the hole.***

Longer downhole life of the all-new Button Drilblade is achieved by thicker application of tungsten carbide, made possible by the cupped design of the insert heads. Also, a new type of rod delivers a higher percentage of the hard metal to the bearing surface.

Tensile strength and density of the forged aluminum blade body is further strengthened by the press-fitted steel inserts. Thus, neither the blade nor the inserts can work loose or break off. Yet the blades are easily washed over. Drilblades are retained in the Stabilizer body by tapered slots, engineered so that the blade is actually tightened during use, and by Double-Safety Lock Plates. Removal of Lock Plates permits the blades to be easily changed on the rig floor.

The Grant Drilblade Stabilizer—already the preferred tool for directional drilling all over the world—is now the most dependable tool available for this work.

The new Button Drilblade is fully interchangeable with Grant standard blades. It is available in all body sizes 'round-the-clock from your Grant service man—or write Grant direct for specifications and prices.

*Patent Applied For

GRANT OIL TOOL COMPANY

2042 EAST VERNON AVENUE, LOS ANGELES 58, CALIFORNIA • Cable Address: GRANTOOL

DISTRICT OFFICES AND WAREHOUSES: *Bakersfield, Compton, Ventura, Woodland, Calif. • Liberal, Kan. • Harvey, Houma, Lafayette, La. • Laurel, Miss. • Farmington, Hobbs, N. M. • New York, N. Y. • Ardmore, Oklahoma City, Okla. Corpus Christi, Houston, Kilgore, Odessa, Tex. • Casper, Wyo. • Edmonton, Pincher Creek, Ft. Nelson, Canada*
Representatives in Argentina, Brazil, France, Italy, Middle East, Mexico, Venezuela

Franks Units are FIRST . . . Because They LAST . . .

THIS UNIT WAS BORN IN 1939 . . . WITH SOME MODIFICATION IT IS SHOWN AS IT LOOKS TODAY

CASE HISTORY UNIT NO. 702

A Franks E. T. model, single drum well servicing unit, was first delivered to Shell Oil Company in March, 1939, for rod and tubing work in East Texas. Later it was sold to Harold Black Drilling Company, Albany, Texas, for regular production drilling. Later the old drawworks was traded in for a larger one which was mounted on the same unit. This rig is still in service.

The old drawworks recently started life as a double-drum single pole mast unit, as shown above, with a well servicing company in Kansas.

WELL SERVICING AND DRILLING UNITS
FRANKS
PAMPA, TEXAS
CABOT

There is no planned obsolesence with FRANKS!

FRANKS UNIT IS AN INVESTMENT with a *future* in mind

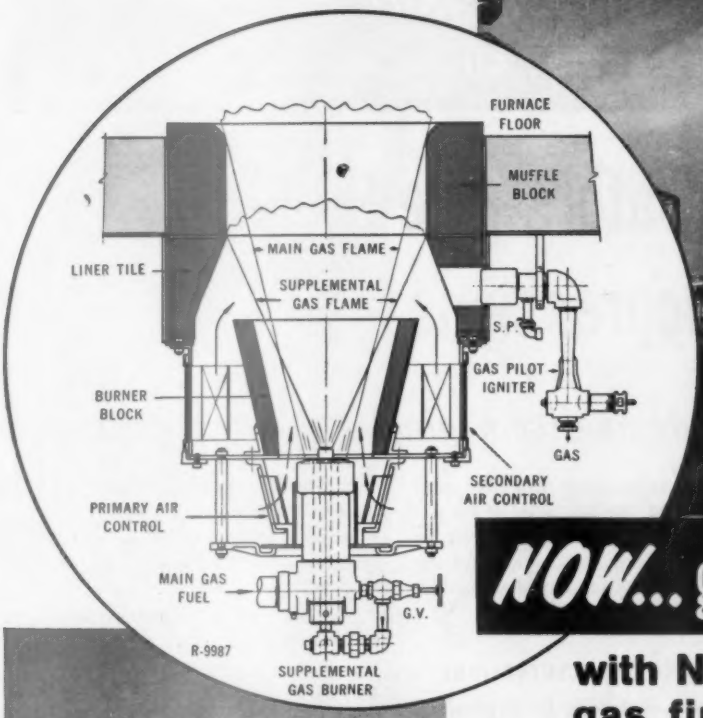
Franks well servicing units are engineered for the future. Each unit is built to give years of trouble-free service under the severest operating conditions. It contains no parts that become obsolete and render the unit unrepairable.

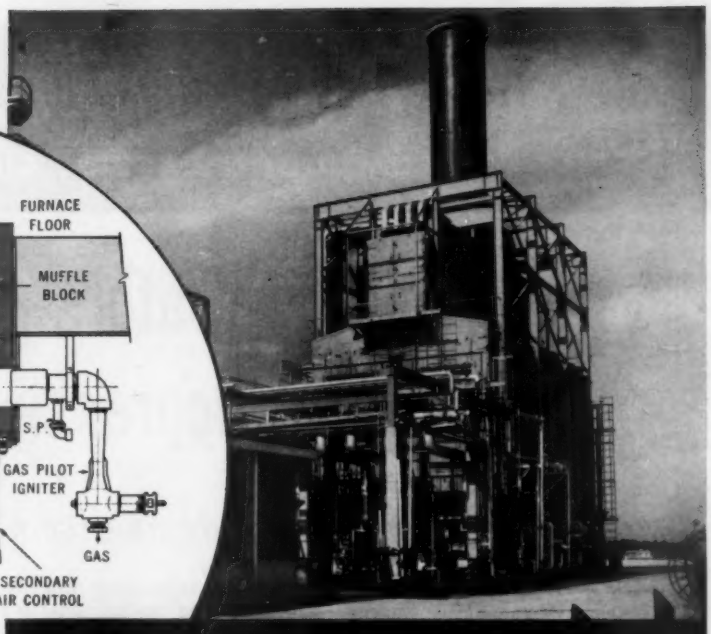
The above history of Unit No. 702 proves it is almost impossible to wear out a Franks part, thus the high trade-in value. This is why more Franks units are sold than any other brand . . . why the higher trade-in value of a Franks. See your Franks representative or write for specifications folder.

They're worth more when you buy 'em, when you trade 'em or when you keep 'em.

WELL SERVICING AND DRILLING UNITS
FRANKS
PAMPA, TEXAS
CABOT

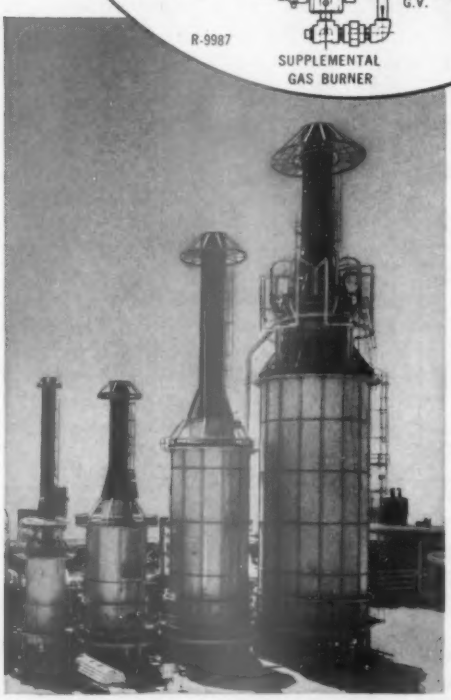
CABOT
CABOT CORPORATION
MACHINERY DIVISION
P. O. BOX 1101 — PAMPA, TEXAS — PH. MOhawk 4-3277





NOW... greater VERSATILITY

with National Airoil C. P. gas firing burner units



Throughout the world . . . in chemical, petroleum, process, pipeline and related industries, National Airoil CHEMICAL-PETROLEUM up-firing burner units are achieving widespread field acceptance. And for good reason!

In accordance with our continuing policy of product improvement, the present design of this gas firing unit (now in actual quantity use) offers several time-and-money-saving "first time" features:

- An increased proportion of combustion air can be induced, partially independent of stack-furnace draft.
- Thorough mixing of the combustion air can be obtained with a minimum of O_2 in the stack gases. Result: high thermal efficiency; maximum radiation heat transfer.
- Capability exists for changing to different gases with some variation in specific gravities and calorific value to maintain approximately the same gas fuel pressures and heat release.
- Proper flame outline can be obtained relative to the furnace dimensions and proximity of tube surfaces.
- An absence of flash or burn back within the burner casting when firing hydrogen-rich gas.
- Regulation ease and capacity flexibility are assured.

National Airoil C. P. gas units can be supplied with a medium pressure gas pilot for electric ignition. A sufficient range of sizes is available to handle standard capacities. A similar National Airoil design also can be furnished for *oil only*, for *combination gas and oil*, or for *forced draft*.

Literature on these versatile C. P. burner units, together with technical and engineering data is available. Why not write for it *today* while you're thinking about it?

NATIONAL AIROIL BURNER

Established 1912
Incorporated 1917

NATIONAL AIROIL BURNER COMPANY, INC.

1284 E. Sedgley Avenue • Philadelphia 34, Pa., U.S.A.

Industrial Oil Burners, Gas Burners and Combustion Equipment

Engineering Progress Report
FROM UNION CARBIDE CHEMICALS COMPANY

Glycol Dehydrators give 90°F. Dew Point Depressions...

Improved regeneration systems give high glycol concentrations

There are two methods commonly used today to dehydrate natural gas: one employs glycols; the other, dry desiccants. Most authorities agree that glycol systems are less expensive in both initial and operating costs. Recent engineering advances now permit dew point depressions up to 90°F. with economical glycol-type dehydrators. Union Carbide Chemicals Company maintains an extensive engineering service group designed to help the natural gas industry obtain the best possible dehydration service with CARBIDE's diethylene glycol and triethylene glycol.

A GRADUAL IMPROVEMENT

Diethylene glycol was first used to dehydrate natural gas in 1936 and by 1939 sixteen glycol type plants were in service providing average dew point depressions in the range of 40°F. Triethylene glycol was first used to dehydrate natural gas in 1949. The dew point depressions realized with glycol type plants have gradually increased until today the standard guarantee is a 65°F. depression or gas containing seven pounds of water per MMSCF, whichever first occurs. For sometime now, some equipment manufacturers have offered a 75°F. dew point depression guarantee.

FACTORS INFLUENCING DEW POINT DEPRESSION

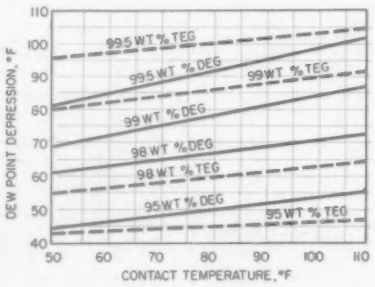
The dew-point depression obtained with a glycol dehydration plant depends upon several factors, such as:

1. Concentration of water in the lean glycol solution.
2. Glycol circulation rate.
3. Contact temperature in the top of the absorber column.
4. Efficiency of gas to glycol contact in the absorber.

Even with conservative design and operation, however, the dew point of the gas leaving the glycol contactor cannot be lower than the equilibrium value for the conditions of temperature and glycol concentration found on the top plate.

HIGH GLYCOL CONCENTRATIONS

The high diethylene and triethylene glycol concentrations now being obtained in plant practice, prompted studies to determine the dew point depressions obtainable with such solutions.



These data indicate that both diethylene and triethylene glycol at 99.5 per cent concentrations provide dew-point depressions in the 80°-105°F. range.

At concentrations of 98 per cent and lower, diethylene glycol provides better depressions than equal concentrations of triethylene glycol, while at 99 and 99.5 per cent concentrations, triethylene glycol appears to allow a 5°-10°F. lower dew point than diethylene glycol.

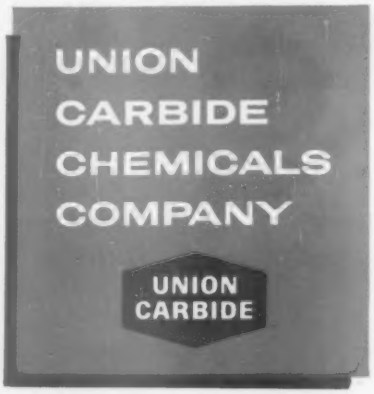
90°F. DEPRESSION MEETS TRANSMISSION REQUIREMENTS

Glycol regeneration equipment on the market today is capable of producing and maintaining glycol concentrations above 99%. Thus, it is possible for equipment manufacturers to guarantee a 90°F. minimum dew point depression. There are very few instances where a 90°F. depression will not meet the water content specifications of any long distance gas transmission company.

CARBIDE'S RESEARCH PROGRAM

Dew point depression studies are but one phase of CARBIDE's extensive research activities designed to improve the products and processes of the natural gas treating industry. CARBIDE's Technical Service Department stands ready to help you obtain the best possible results from your gas treating installations. For more information on the use of CARBIDE's glycols for gas dehydration, call the nearest CARBIDE technical representative or write, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

UNION CARBIDE is a registered trade mark of Union Carbide Corporation.



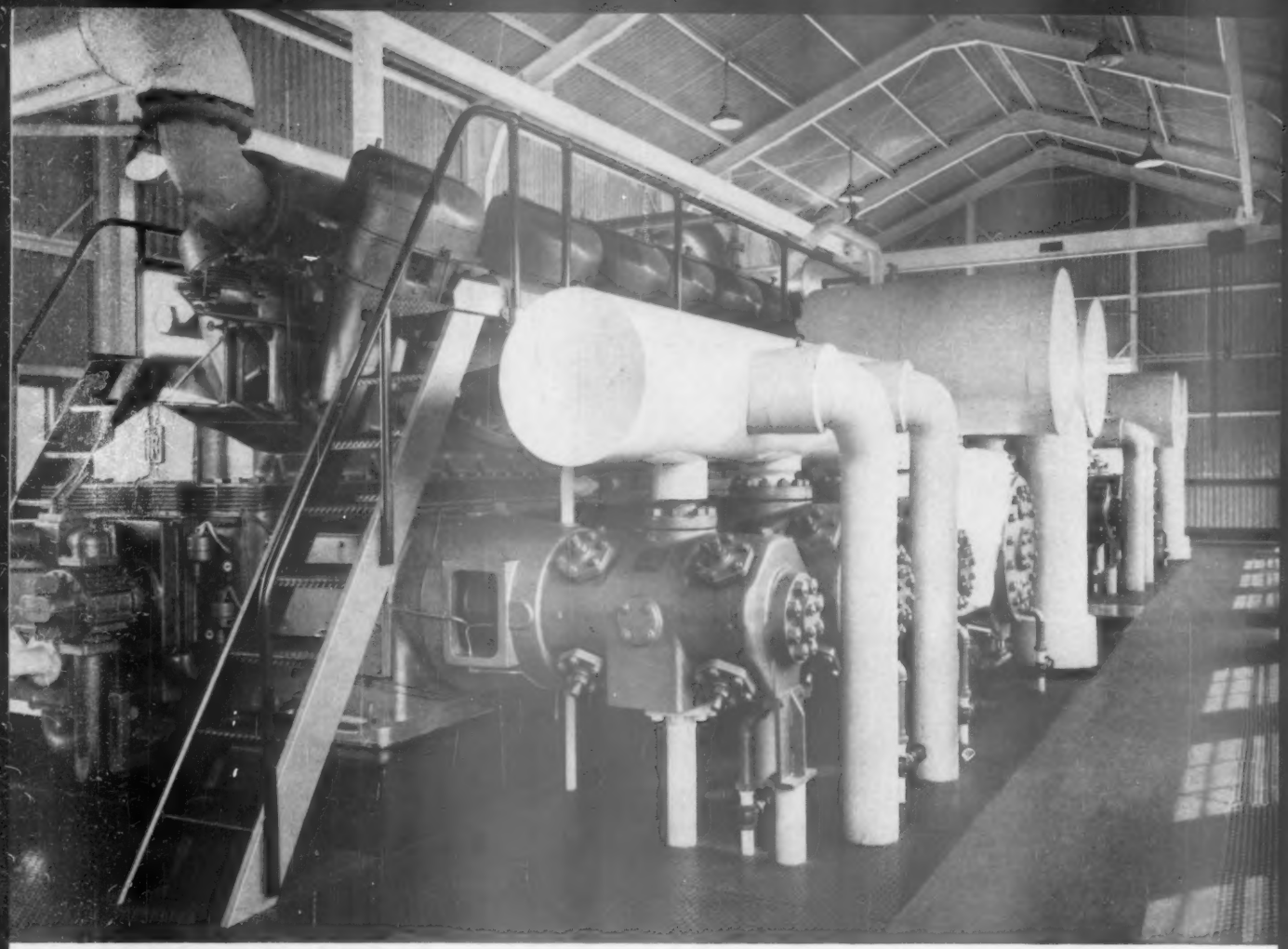
XP-20/Spersene mud systems are so simple, yet they can do what other muds have tried to do for years

In spite of this simplicity, XP-20/Spersene muds are unusually stable under high temperatures and high pressures. They have outstanding filtration characteristics. They retard the natural swelling of solids. They have excellent tolerance for contaminants. XP-20/Spersene muds do what other muds have tried to do for years, and at much less cost.

Magcobar Complete DRILLING MUD SERVICE

DRESSER INDUSTRIES, INC.
OIL • GAS
CHEMICAL
ELECTRONIC
INDUSTRIAL

MAGNET COVE BARIUM CORPORATION / HOUSTON, TEXAS



I-R ENGINE-COMPRESSORS FOR MULTIPLE SERVICE

Three 1320-hp Ingersoll-Rand KVG 4-cycle V-angle gas-engine compressors, each with five compressor cylinders, handling propane refrigeration and recompressor services at the Lowry Gasoline Plant of the Superior Oil Company.

Ingersoll-Rand

125A14

11 Broadway, New York 4, N. Y.

COMPRESSORS • ENGINES • PUMPS • AIR & ELECTRIC TOOLS
CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

I-R ENGINES FOR GENERATING

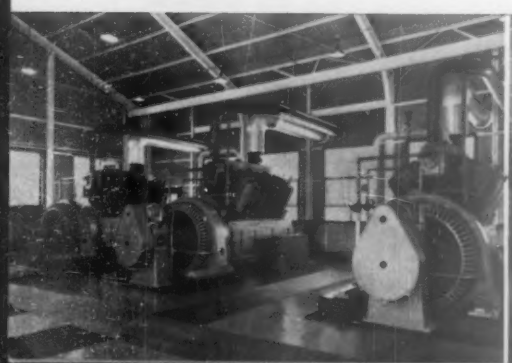
Three Ingersoll-Rand 408-hp PSVG gas engines driving 280-kw generators. These 4-cycle V-angle units are designed for economy and dependability in continuous service such as this.

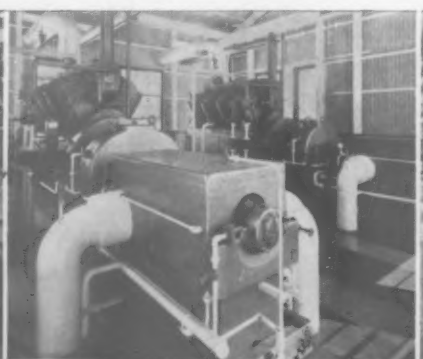
I-R ENGINE-PUMPING UNITS

Ingersoll-Rand 544-hp PSVG 4-cycle V-angle gas engines driving 8-stage horizontally-split HMTA pumps, also built by I-R, handling lean oil at the Lowry gasoline plant.

I-R PUMPS FOR PROCESSING

In foreground, 6-stage Ingersoll-Rand CNTA horizontally-split pumps on de-ethanizer feed service at the Lowry plant. In background, 3-stage VP vertical pumps for product boosting.





COMPRESSORS
PUMPS
ENGINES
FROM ONE SOURCE

...for SIMPLIFIED PROCUREMENT, OPERATION and MAINTENANCE

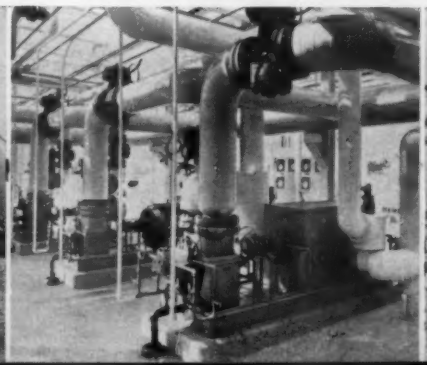
The Superior Oil Company chose Ingersoll-Rand for all engines, compressors and pumps at its Lowry Gasoline Plant near Lake Arthur, La.

Because the Lowry plant has centralized its major mechanical equipment responsibility with I-R, it can look forward to a number of significant economies. For example, operating procedures on all engines and engine-compressors are similar, as all of them are 4-cycle V-angle units. Parts inventory may be kept to a minimum, because I-R design keeps parts interchangeability at a maximum. Maintenance procedures are standardized. And a single engineering and design philosophy developed the equipment.

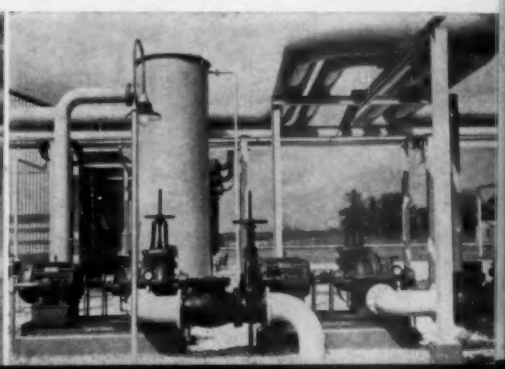
Since I-R offers (1) the most complete line of centrifugal pumps and hydraulic turbines, (2) the world's most comprehensive compressor experience, building reciprocating, centrifugal, rotary and ejector types, and (3) a century of service to the petroleum industries, you too have a good reason to choose Ingersoll-Rand. Your I-R representative can give valuable help for your problem—call him today.

I-R PUMPS FOR LOADING
Part of a battery of Ingersoll-Rand vertical centrifugal pumps used to transfer liquids from the storage tanks in the background to barges and to tanker trucks.

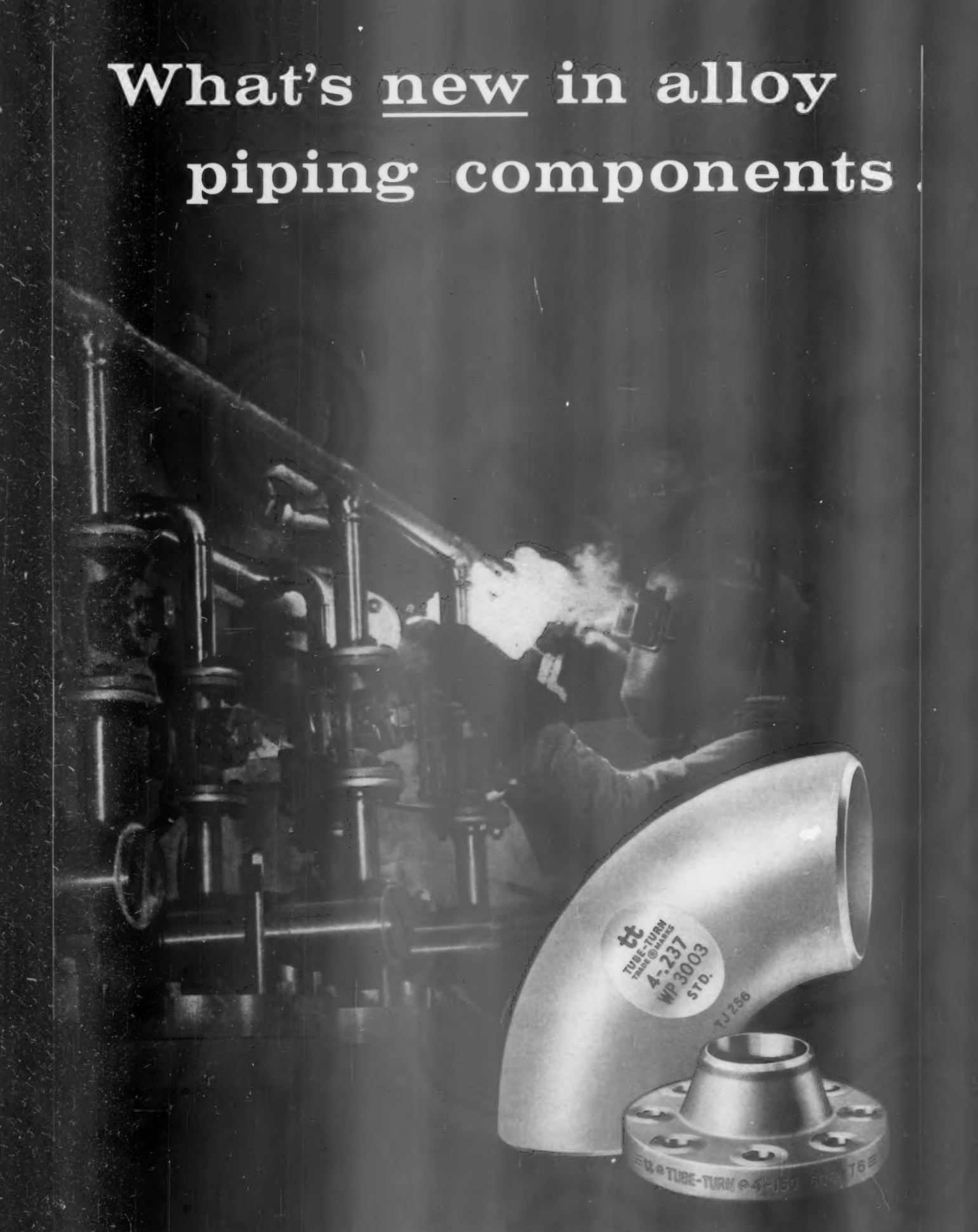
I-R HYDRAULIC TURBINES DRIVING I-R PUMPS
A battery of vertically-split SJV stripper bottoms pumps. The pump in the foreground is driven by an I-R rich-oil turbine, as is another unit on de-ethanizer reboiler service.



I-R COOLING WATER PUMPS
And still more I-R pumps! These units handle jacket water for all the I-R gas engines and engine-compressors at the Lowry gasoline plant.



What's new in alloy piping components



. . . . get it first from TUBE TURNS

Through the science of metallurgical research has come an ever wide use of new "wonder" metals and alloys for critical-service piping systems. And to assure the selection of the *right* piping components for these systems has come the most logical trend to specify them by brand name. More and more the name specified has been TUBE-TURN. This is also most logical as no other name in welding fittings and flanges means so much.

TUBE-TURN alloy fittings and flanges are the product of pioneering, of a wealth of experience without equal, of an investment in related research and engineering exceeding that made by all other such manufacturers *combined*. TUBE-TURN alloy fittings and flanges are universally recognized and accepted as a mark of *known value*. This is why TUBE-TURN alloy fittings and flanges were selected for the now historic Manhattan Project, and specified for subsequent nuclear powered vessels. This is why TUBE-TURN corrosion-resistant, non-contaminating alloy fittings and flanges are preferred by the Petrochemical and Chemical Processing Industries. This is why experienced piping engineers everywhere look first to Tube Turns for the *latest* in alloy piping components.

Safeguard the performance of your critical-service piping systems with genuine TUBE-TURN alloy fittings and flanges. Your authorized Tube Turns Distributor is ready to serve your needs for Stainless Steels, Aluminum, Nickel, Monel, Inconel, Hastelloy B & C, Copper, Silicon Bronze, Red Brass, Admiralty Metal, Titanium, Zirconium, Zircaloy and other ferrous and non-ferrous metals and alloys. For further information write today for Bulletin TT266-M218.
TUBE TURNS, Louisville 1, Kentucky.

"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

Inferior Substitutes Can Be Avoided!

Specifications calling for TUBE-TURN welding fittings and flanges with "or equal" wording need not be the open door to risk and trouble. Responsible suppliers and contractors will not only serve you honestly and properly, they will be glad to provide proof of it. They will give you an affidavit that they have met your specifications to the letter . . . that they have furnished genuine TUBE-TURN welding fittings and flanges complying with all requirements of applicable ASTM Specifications and ASA Standards. This is a sensible procedure for everyone concerned. Write us today for Bulletin 1031-M218 on this subject.

TUBE-TURN Alloy Fittings and Flanges are Stocked By and Sold Exclusively Through Authorized Distributors.

TUBE TURNS

Division of CHEMETRON *Corporation*

A. O. SMITH METERS RECORD EVERY DROP AUTOMATICALLY ALONG THE LINE

From oil well to consumer — only A. O. Smith offers modern rotary positive displacement meters for precise, automatic measurement of every drop along the way.

A. O. Smith's unique rotary principle results in the simplest, most accurate and trouble-free liquid measurement ever devised. Friction is reduced to a minimum. There are no valves or pistons to discourage satin-smooth flow.

SUSTAINED ACCURACY! A. O. Smith meters have a proven record of consistent ability to retain original accuracy for long periods of time throughout the greatest flow range.

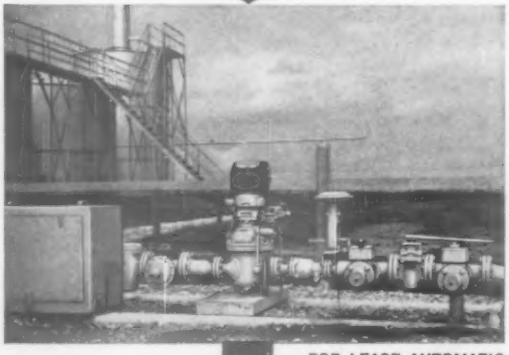
LONG OPERATING LIFE! Low pressure-drop saves time and power, prolongs service life. Conservative rotor speeds reduce wear.

SIMPLIFIED MAINTENANCE! The metering mechanism can be removed intact without disturbing the high-pressure pipe line connections. All servicing is quick, easy, inexpensive.

And only A. O. Smith rotary positive displacement meters feature revolutionary Armorloy, the new solid-film lubricant process which greatly extends meter life and boosts measurement capacities as much as 25%.

A. O. Smith meters are available with a wide choice of counters and printers, including the automatic stop mechanism. For specific data on the complete line, see your A. O. Smith meter representative.

AT WELL HEAD—Battery of A. O. Smith M-13 meters accurately record daily product for individual oil wells.



FOR LEASE AUTOMATIC CUSTODY TRANSFER — A. O. Smith W-13 meter with automatic gas-operated controls regulating delivery of crude from lease to pipe line.

Through research ... a better way

A.O.Smith
CORPORATION

METER AND SERVICE STATION EQUIPMENT DIVISION

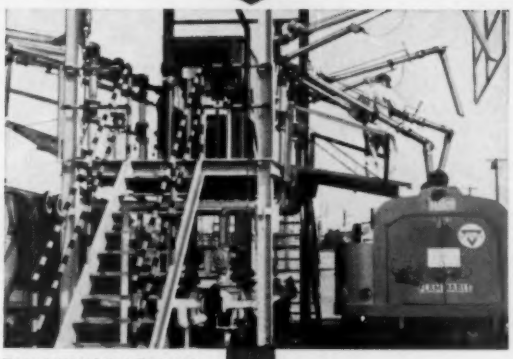
Factory: 1802 Wagner Ave., Erie, Pa. Offices: Atlanta 24, Ga.; Chicago 3, Ill.; Houston 2, Texas; Los Angeles 22, Calif.; New York 17, N. Y.; Newark, Calif.; Tulsa, Okla. A. O. Smith INTERNATIONAL S.A., Milwaukee 1, Wis., U. S. A.

DELIVERY TO AND FROM PRODUCTS PIPE LINE — Eight A. O. Smith model M-90 meters with combinators measuring finished product to the pipe line — similar installation is used at take-off stations.

DELIVERY TO REFINERY — Four A. O. Smith B-250 meters record crude from 16-in. line. Meters are connected by combinator units to record volume on printed ticket.

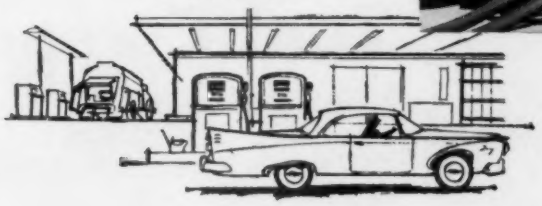
CRUDE RECEIPTS AT PUMPING STATION — A. O. Smith S-60 meter (left, center) measures delivery from 11 leases into main pipe line. A. O. Smith S-28 meter (lower, right) measures product from another field.

DELIVERY TO MARKETING DEPARTMENT—Two A. O. Smith AS-60 meters and two AS-42 meters with accessories record loading of refinery finished petroleum products to marketing department storage.

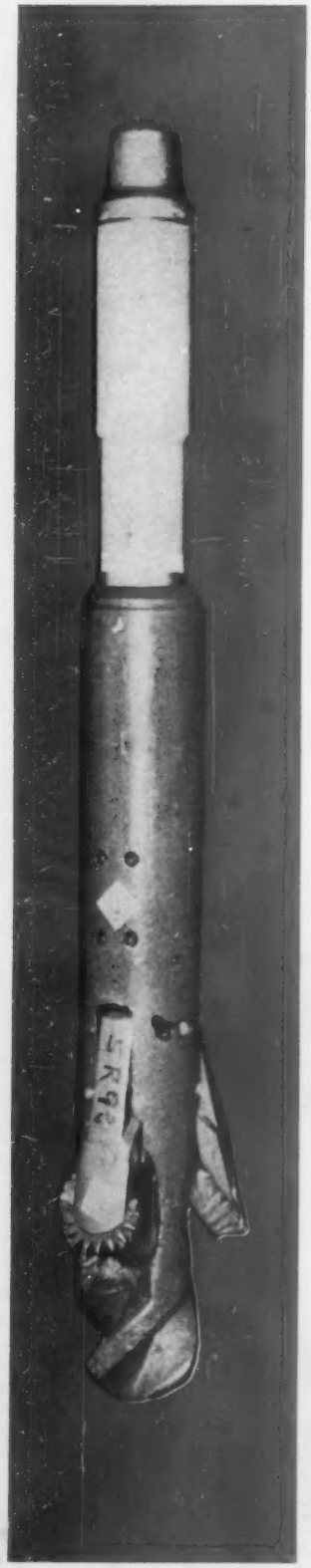


TANK TRUCK LOADING AT TERMINAL — A. O. Smith model AS-42 meters with extended counters, set stop valves and other accessories accounting for truck loading out of terminal.

FROM THE TRUCK TANK — Right down to the time of delivery, A. O. Smith meters give precise, sustained measuring accuracy—whether it's petroleum products for the service station (model T-30) or for the home (model T-6).



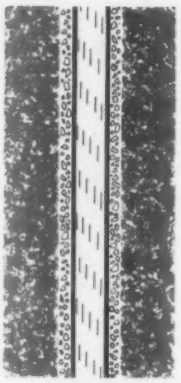
Ours is a Republic, not a Democracy,
LET'S KEEP IT THAT WAY!



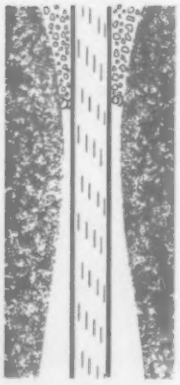
GET A PLUS ON YOUR GRAVEL PACK WITH A ROTARY "LOCKOMATIC"

Now you can eliminate thin space areas in your holes that cause gravel bridges or allow sand to pass with a Rotary "Lockomatic" Expanding Hole Opener. The "Lockomatic" makes a full-gauge, true-cylinder hole, assuring you a full pack of gravel!

The rock bit action of the "Lockomatic's" roller cutters prevents any glazing or troweling of the formation and gives efficient drainage of the packed zone.

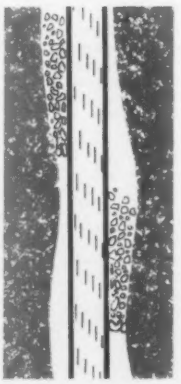


"LOCKOMATIC" HOLE
Full-gauge and true-cylinder...assures a full gravel pack!



UNDERGAUGE HOLE
Hard rock formations can cause tight spots and form gravel bridge.

OFFCENTER HOLE
Some tools cut un-even holes that form gravel bridges.



FOR GRAVEL PACKING or any other hole-opening job "LOCKOMATIC" MEANS SATISFACTION!

The Rotary Oil Tool Company "Lockomatic" Hole-Opener and Section Mill has never been stuck in a hole due to cuttings fouling the mechanism or failing to unlock.

Write today for complete product catalog.

Rotary Oil Tool Company

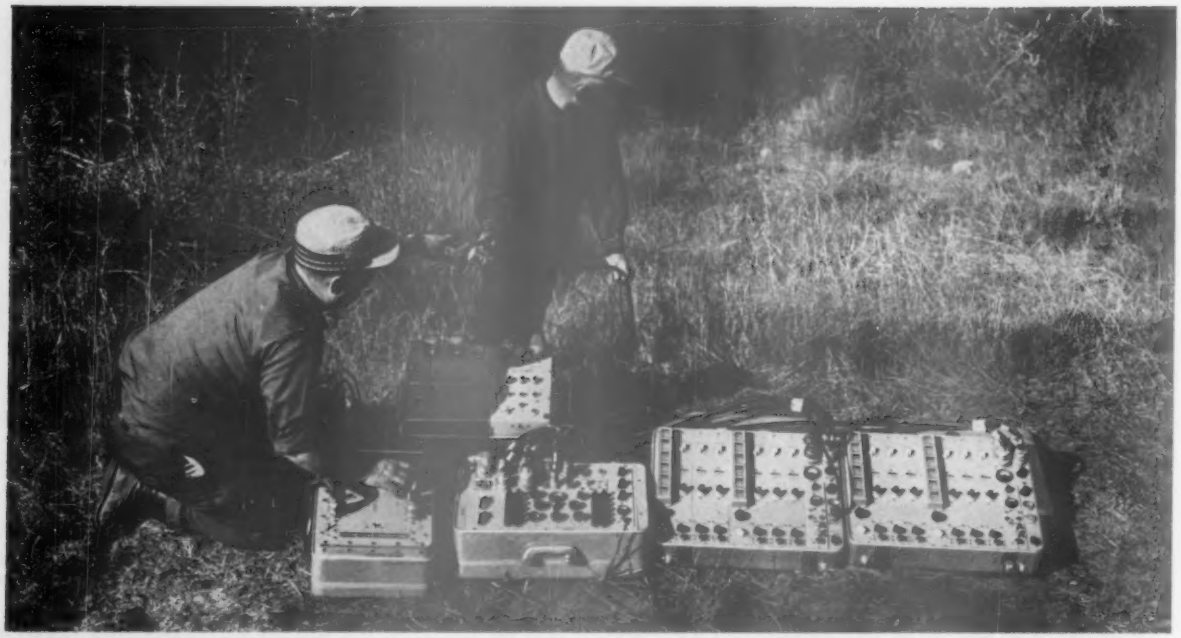
Serving the industry over 20 years

8655 Whitaker Avenue, Buena Park, California
LAmbert 6-4621 • Cable ROTOILTOOL

every hour of
every day
your Milwhite
engineer works
to reduce your
drilling costs...

MILWHITE

MILWHITE MUD SALES COMPANY
HOUSTON, TEXAS
DIVISION OF MISSISSIPPI RIVER FUEL CORPORATION



NO RECORDING TRUCK CAN GET BETTER RESULTS THAN WESTERN'S COMPLETELY TRANSISTORIZED PORTABLE TFA SYSTEM

Through Western Geophysical Company's dramatically successful TFA transistorized field amplifiers, Western crews on portable seismic surveys are obtaining results equivalent in all respects to those possible through the best standard, truck-mounted, vacuum tube amplifiers.

The reason: – Every function on the truck-mounted amplifiers is also standard – without compromise – on the TFA. To this flexibility, TFA adds a signal-to-noise ratio equal to that of Western's notably quiet FA35 truck-mounted amplifiers. Also, TFA is temperature-stable from —40°F. to +140°F.

Western's portable seismic system saves you money: Less manpower needed because there is less to carry. The amplifiers are housed in 12-channel suitcases. Each case weighs 42 pounds, complete with satellite-type batteries. The magnetic tape recorder, camera, and control panel also are completely transistorized. Mounted in suitcases, they weigh 55 pounds, 44 pounds and 26 pounds, respectively. The only external power source needed for the entire system is a small 12-volt battery for the motors of the magnetic tape transport and camera.

Western logistics saves you money, too. Western crews have surveyed successfully in the coldest, hottest, wettest, driest, and roughest of oil prospect areas. They are skilled in mastering the toughest supply problems with minimum waste motion.

When you need contract geophysical services for any type of prospect, remember: YOU ARE *SURE* OF MAXIMUM USABLE DATA WITH A WESTERN CREW ON THE JOB!

To discuss, in confidence and without obligation, how Western would work for you, write or call:

Instruments pictured above are (from left) camera, control panel, two TFA cases. Behind camera is the Western magnetic tape transport.

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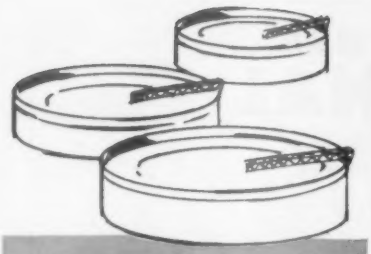

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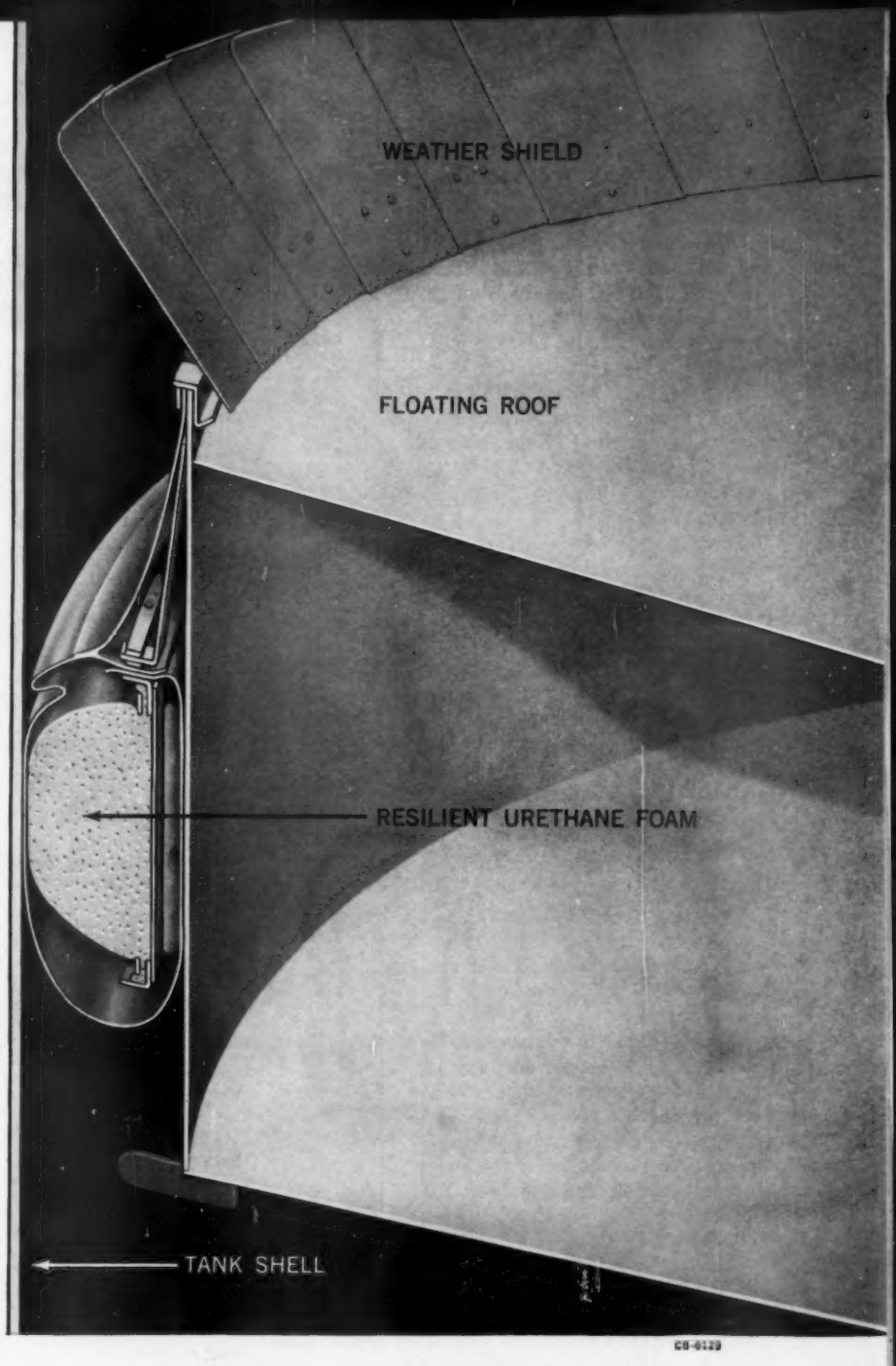

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- **Positive Protection Against Lightning Ignition**

Another CB&I development

THEY SAY

Our Merle's a good scout

Dear Sir:

Having just finished reading your nice account of our Marsa Brega opening in the October 30 issue (p. 120), I naturally turned to the front of the book so I could enjoy it from cover to cover—as usual.

Your headline "What's in a name?" (Journally Speaking, p. 95) caught the attention of one who is often called "Fray" and more often spelled "Frye" and (by the lazy writers) "Fry."

The only trouble with the column is that there should have been more about my old friend Merle Blakely. He is not only all you said about him, but he is also trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean, and reverent.

Charles W. Frey
Public Relations Manager
Esso Standard (Libya)

A matter of concern

Dear Sir:

My compliments to The Oil and Gas Journal for the editorial appearing on Page 91 of the December 4 issue ("Who will man the drilling rigs?).

The question of competent drilling crews is a matter for serious concern of operators as well as contractors, and the Journal's editorial very aptly and correctly points out the possible repercussions from the present situation and the need for it to be corrected.

Warren L. Baker
Executive Vice President
American Association of
Oilwell Drilling Contractors

They had earlier models

Dear Sir:

We were very interested in your article "Automation licks Argentine production problems," in the issue of November 6, 1961 (p. 98).

We are enclosing with this letter a list of contracts which have been placed with our company together with an extract from the Petroleum Times (Dec. 16, 1960) describing the remote supervisory control equipment for the Oil India pipeline.

We are taking this opportunity

The OIL AND GAS JOURNAL

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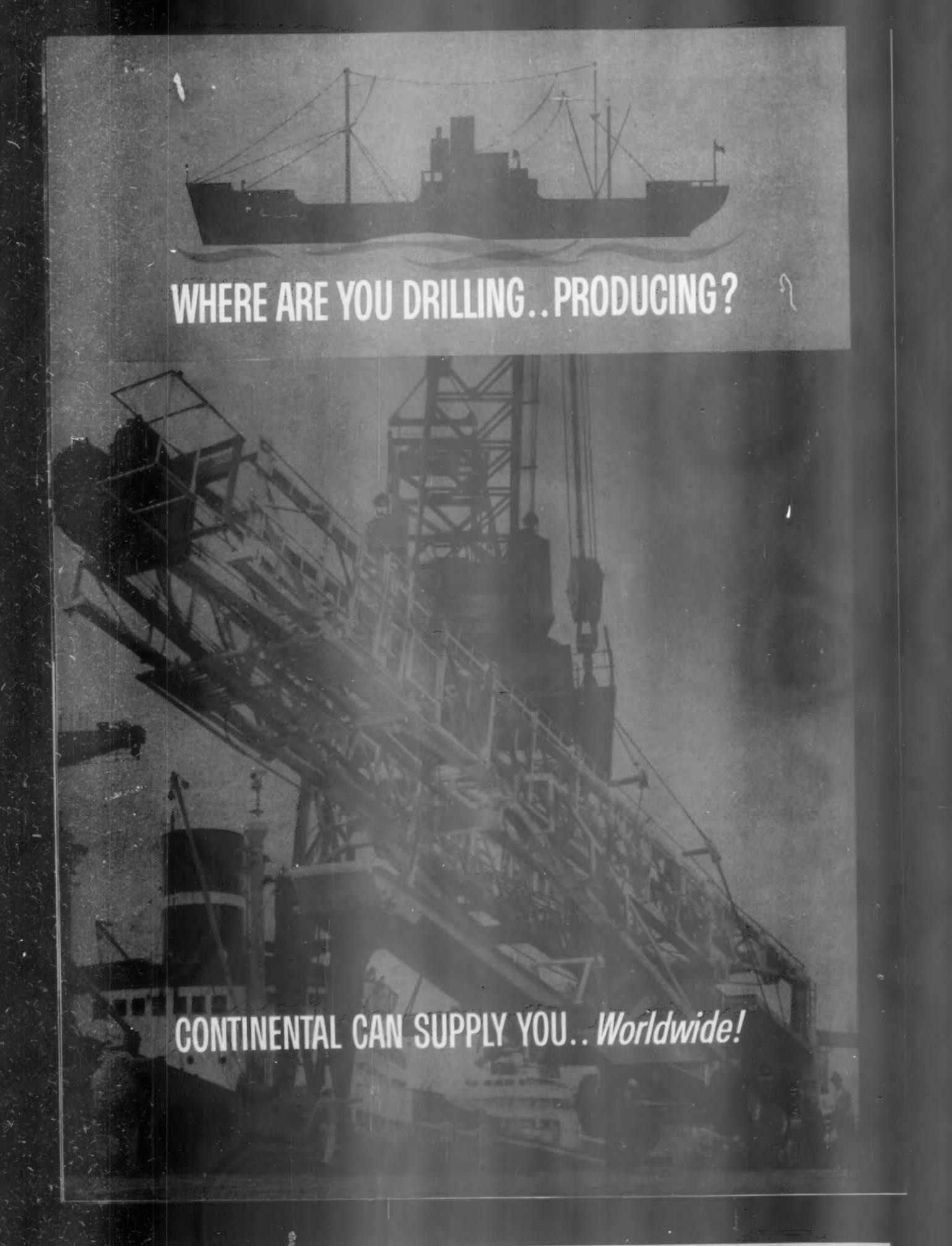
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Brussels, Belgium

One more for guided tour

Dear Sir:

In Mr. La Motte's recent excellent article, "An oil man's guide to Washington," (OGJ, Nov. 13, p. 135) it was indeed unfortunate that he overlooked a large, highly specialized professional part of the Department of the Interior. I refer to the Geological Survey's Branch of Oil and Gas Operations.

This branch, composed of approximately 86 petroleum engineers, supervises oil and gas operations on leases issued by the department covering public, acquired, outer Continental Shelf lands; also on Indian, military and certain naval petroleum reserve lands.

These duties are performed through the headquarters office in Washington, seven regional offices, and 24 district offices located in the states of California, Colorado, Louisiana, Montana, New Mexico, Oklahoma, Alaska, Utah, and Wyoming.

D. W. Solanas
Regional Staff Engineer
Gulf Coast Region
U. S. Geological Survey
New Orleans

Well briefed

Dear Sir:

Among the several problems adversely affecting the welfare of the oil industdy—excessive inventories of crude oil and products, irresponsibly excessive refinery runs, improvident marketing policies—none is more important than the need for developing real competition among oil, coal and natural gas so that gas, by reason of governmental controls, will not have an unfair advantage over other energy materials. Some hope is entertained that the "new look" by the Federal Power Commission may ultimately lead to a reasonable solution of this problem.

The first article by Henry Ralph in which he analyzes the producing industry's presentation on gas prices at the FPC is to be commended for a simple and lucid highlighting of the producers' arguments developed from mountains of supporting data (OGJ, Oct. 30, p. 109).

The producers' arguments are charged with almost irresistible logic and I hope they have made impressions upon the commission. But I could also hope that they are as well briefed as Mr. Ralph's summaries, as I choose to call them.

Emby Kaye
Tulsa

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

JANUARY

7-10 Pipe Line Contractors Association, annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.
8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.
11-12 Southern Gas Association, round-table conference on technical uses of electronic computers, Paso del Norte, El Paso, Tex.
16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.
17-19 National Association of Corrosion Engineers, Canadian region eastern division conference, King Edward Hotel, Toronto.
19 Natural Gas Processors Association, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.
24-26 American Society of Mechanical Engineers, second symposium on thermophysical properties, Princeton University, Princeton, N. J.
24-26 Texas A&M College, symposium on instrumentation for the process industries, Memorial Student Center, College Station.
31-Feb. 1 National Petroleum Refiners Association, Gulf Coast regional meeting, Ben Milam Hotel, Houston.

FEBRUARY

1-3 American Law Institute, American Bar Association, joint committee on continuing legal education, forum on electronic computers, Statler-Hilton Hotel, Los Angeles.
4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.
12-13 Missouri Oil Jobbers Association annual convention and trade exhibit, Hotel Chase, St. Louis.
14-16 Southwestern Legal Foundation, an-

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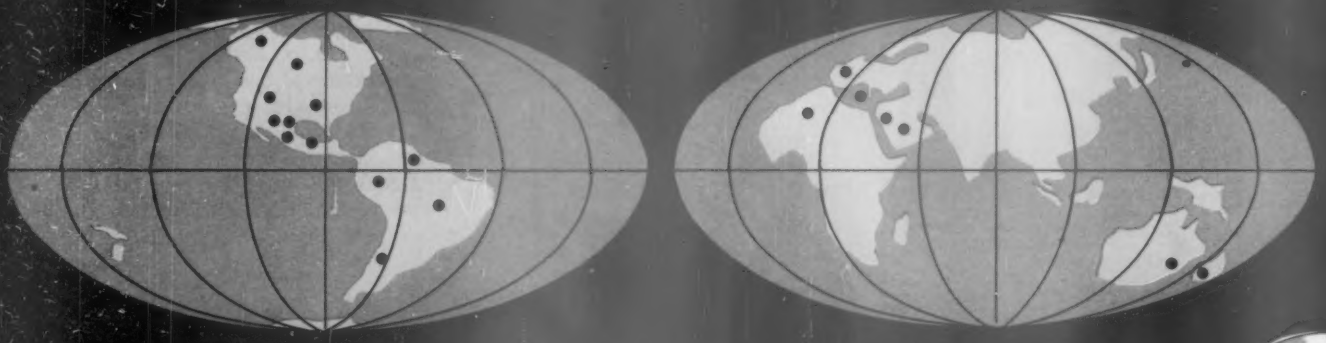

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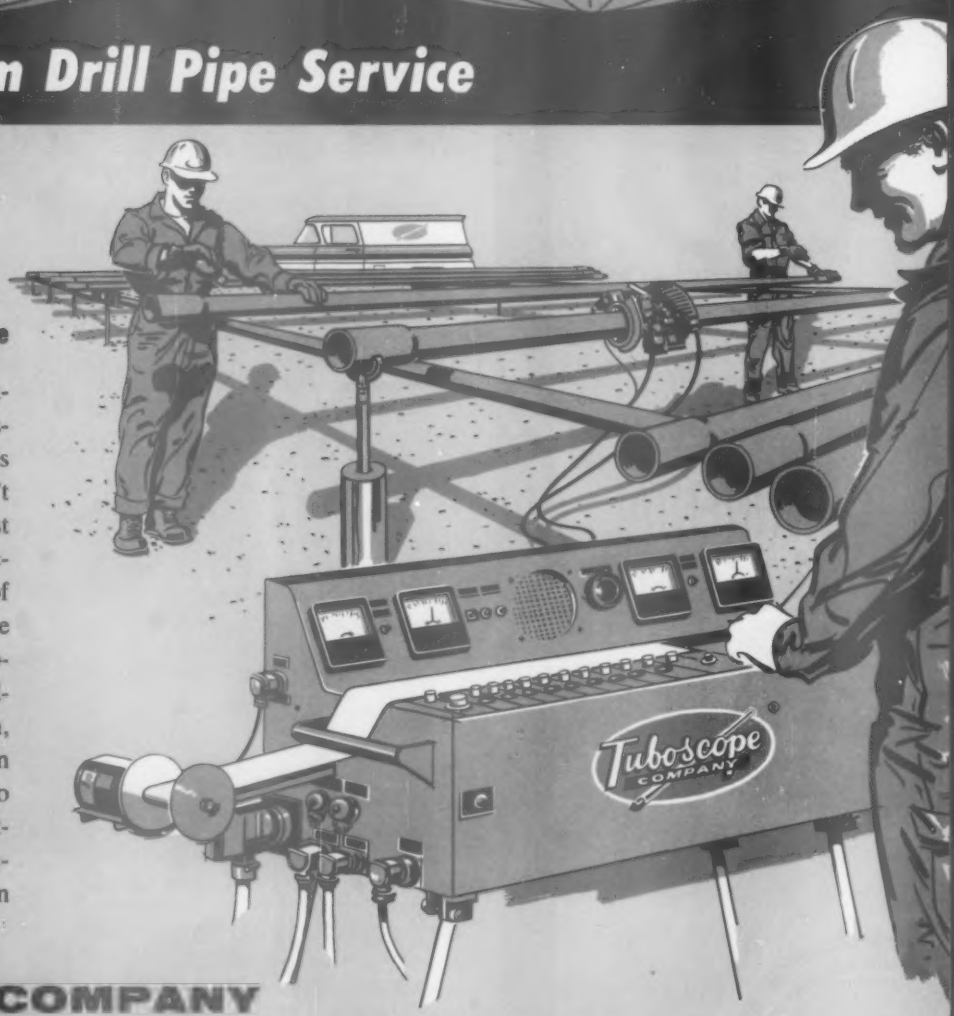

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nual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

14-17 Pipe Line Contractors Association of Canada, Castle Harbor Hotel, Bermuda.

16 Natural Gas Processors Association. South Louisiana regional meeting. Lafayette Petroleum Club, Lafayette.

18-22 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, New York City.

22 Chemical Institute of Canada, protective coatings division, Seaway Hotel, Toronto.

23 Chemical Institute of Canada, protective coatings division, Windsor Hotel, Montreal.

28-Mar. 2 American Petroleum Institute, Division of Production, southern district meeting, Rice Hotel, Houston.

MARCH

1-2 Southwestern Legal Foundation, conference on economics of gas industry, Southwestern Legal Center, Dallas.

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

4-8 American Society of Mechanical Engineers, gas turbine-process industries conference, Shamrock Hilton Hotel, Houston.

6-7 National Petroleum Refiners Association, eastern regional meeting, Sheraton-Cleveland Hotel, Cleveland.

6-7 University of Kansas, Southwest Kansas Center, corrosion institute, Court House, Liberal, Kans.

13-15 Symposium on Application of Statistics and Computers to Fuels and Lubricants Research Programs, sponsored by research branch, office of the chief of ordnance, Department of the Army, Granada Hotel, San Antonio.

15-16 Society of Exploration Geophysicists, annual midwestern meeting, Hotel Texas, Fort Worth.

15-16 Society of Petroleum Engineers of AIME, economics and valuation symposium, Dallas.

16 Natural Gas Processors Association, Oklahoma regional meeting, Sheraton-Oklahoma Hotel, Oklahoma City.

19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, annual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern district meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

27-29 American Society of Mechanical Engineers, power conference, Sherman Hotel, Chicago.

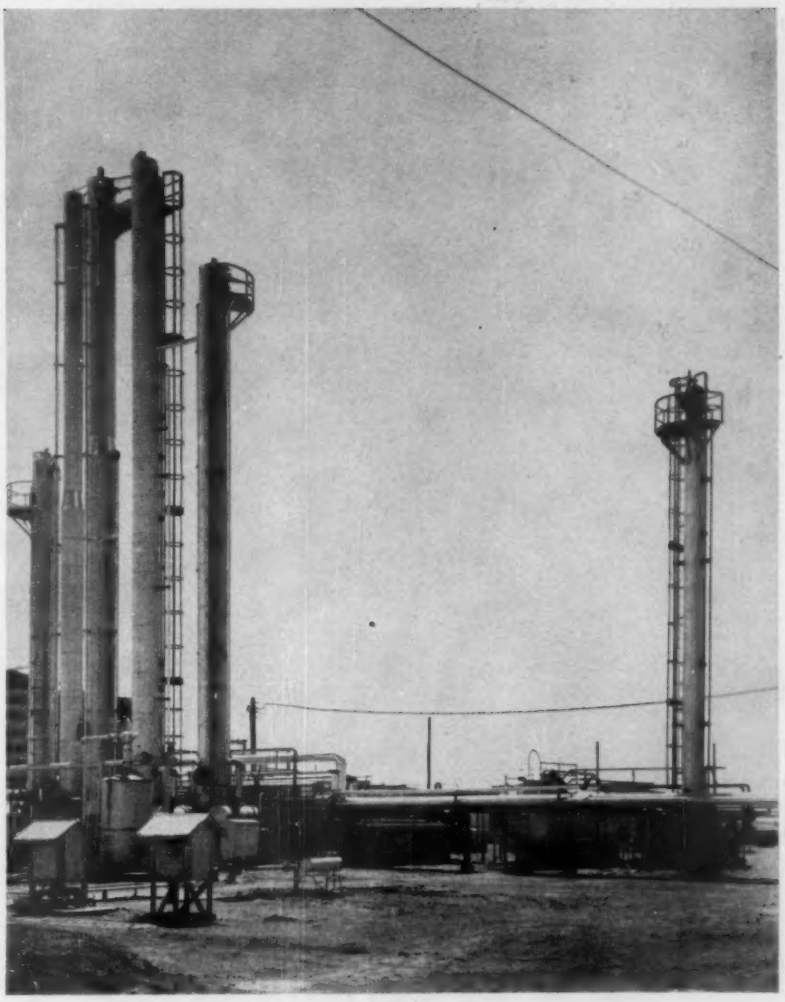
APRIL

2-4 National Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio.

3 Chemical Institute of Canada, chemical economics division conference, Royal York Hotel, Toronto.

3-4 University of Kansas, Southwest Kansas Center, gas compressor institute, National Guard Armory, Liberal, Kans.

4-6 API, Division of Production, Mid-



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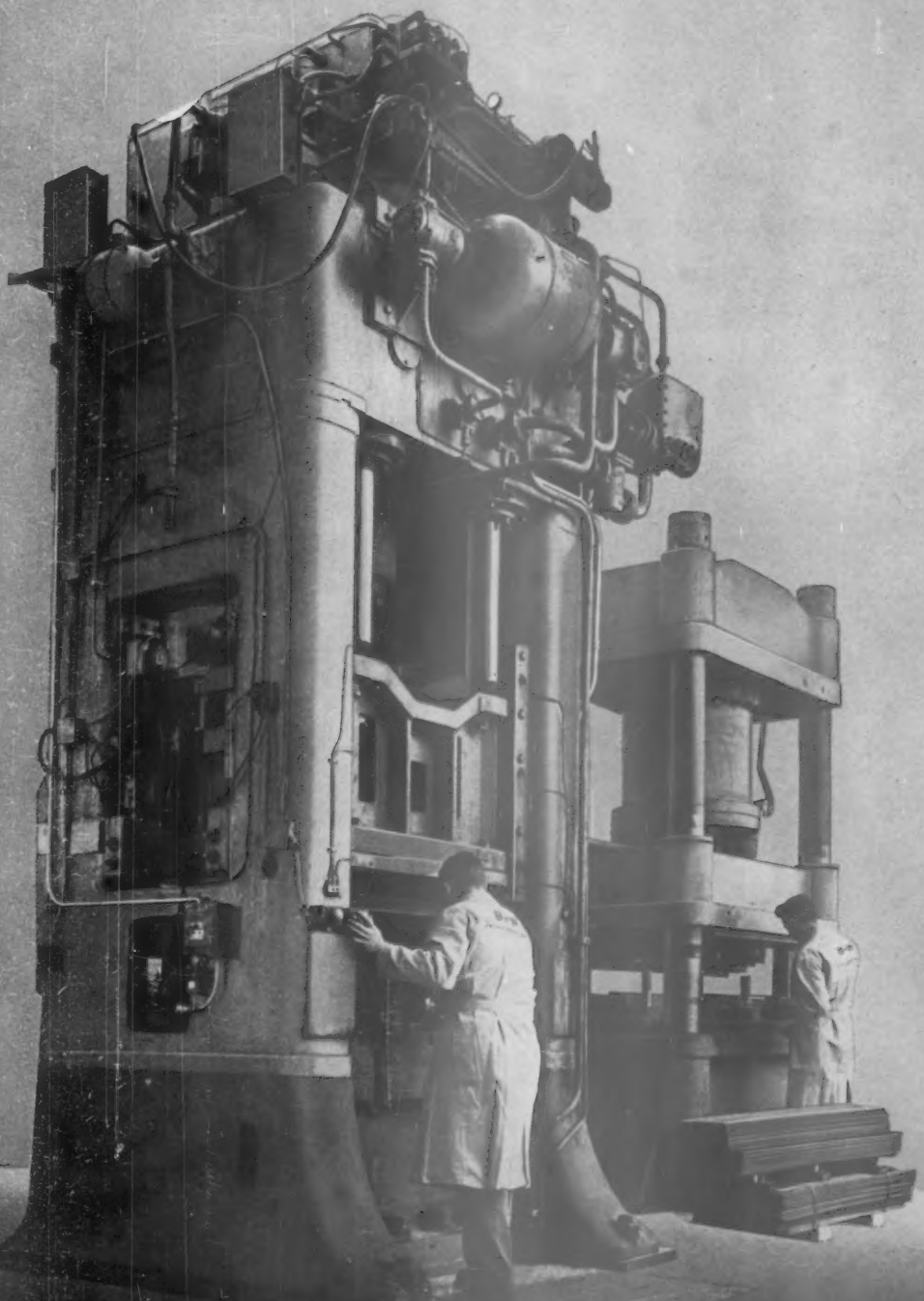

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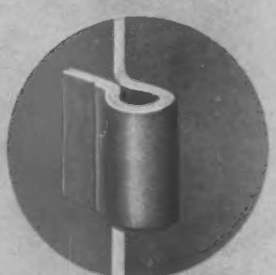

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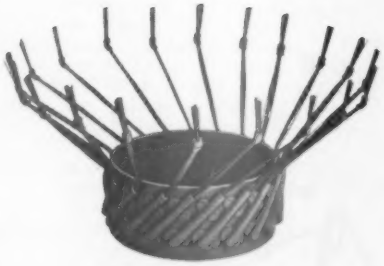

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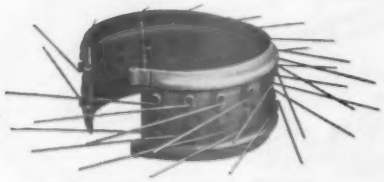

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5-6 Society of Petroleum Engineers of AIME, upper Gulf Coast region, drilling and production practices conference, Beaumont, Tex.

9-10 Instrument Society of America, national chemical and petroleum instrumentation symposium, Wilmington, Del.

9-11 Mid-West Gas Association, annual meeting, Hotel Radisson, Minneapolis.

9-12 National Oil Fuel Institute, national oil heat and air conditioning exposition, Chicago.

11-12 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, convention and exposition, Dallas.

11-13 API, Division of Production, Rocky Mountain district meeting, Hilton Hotel, Denver.

12-13 Society of Petroleum Engineers of AIME, new petroleum production and reservoir engineering developments, Mayo Hotel, Tulsa.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel, Boca Raton, Fla.

15-19 American Society of Mechanical Engineers, oil and gas power division conference, Shoreham Hotel, Washington.

17 Society of Plastics Engineers, Philadelphia section, regional technical conference, Sheraton Hotel, Philadelphia.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

17-19 American Society for Metals, regional conference and exhibition, materials and materials processing for the petroleum, petrochemical and chemical industries, Shamrock-Hilton Hotel, Houston.

23-25 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Salt Lake City.

24-26 American Society of Mechanical Engineers, production engineering conference, Van Curler Hotel, Schenectady, N. Y.

25-27 Natural Gas Processors Association annual convention, Hilton Hotel, Denver.

26-28 Society of Economic Paleontologists and Mineralogists, Permian Basin section, annual meeting and field conference.

29-May 1 Independent Petroleum Association of America, midyear meeting, Hotel Muehlebach, Kansas City.

29-May 1 Empire State Petroleum Association, spring convention, Statler-Hilton Hotel, Buffalo, N. Y.

29-May 2 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

30-May 2 Southern Gas Association, annual meeting, and American Gas Association, transmission conference, Rice Hotel, Houston.

30-May 2 API, Division of Transportation, annual tanker conference, Del Monte Lodge, Pebble Beach, Calif.

MAY

2-3 Rocky Mountain Oil and Gas Association, midyear meeting, Henning Hotel, Casper, Wyo.

2-4 API, Division of Finance and Accounting, midyear meeting, Americana Hotel, Bal Harbor, Fla.

4 Chemical Institute of Canada, rubber chemistry division, Niagara Falls, Ont.

7-8 Society of Petroleum Engineers of AIME, North Texas section, fifth

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biennial secondary recovery symposium, Wichita Falls, Tex.

7-8 American Society of Mechanical Engineers, maintenance and plant engineering conference, Royal Orleans Hotel, New Orleans.

10-11 API Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

11 Natural Gas Processors Association, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

11-12 Kansas Independent Oil and Gas Association, annual meeting, Broadview Hotel, Wichita.

14-17 API, Division of Refining, midyear meeting, Fairmont and Mark Hopkins hotels, San Francisco.

16-18 API, Division of Production, eastern district meeting, Deshler Hilton Hotel, Columbus, Ohio.

17-18 Society of Petroleum Engineers of AIME, production automation meeting, Hobbs, N. M.

20-23 American Institute of Chemical Engineers, national meeting, Lord Baltimore Hotel, Baltimore.

22-23 National Petroleum Refiners Association, computer conference, Ben Milam Hotel, Houston.

22-25 API, Division of Marketing, midyear meeting, Queen Elizabeth Hotel, Montreal.

23-25 API, Division of Transportation, annual pipeline conference, Denver Hilton Hotel, Denver.

23-25 Eleventh National Telemetering Conference, Sheraton-Park Hotel, Washington.

24-25 AIME, Rocky Mountain petroleum sections, annual joint meeting, Billings, Mont.

27-30 Chemical Institute of Canada, Canadian chemical conference and exhibition, Macdonald Hotel, Edmonton.

JUNE

5-7 American Society of Mechanical Engineers, fuels symposium, Rutgers University, New Brunswick, N. J.

10-15 American Society of Mechanical Engineers, summer annual meeting, Chateau Frontenac, Quebec.

13-14 National Petroleum Refiners Association, Mid-Continent regional meeting, Lassen Hotel, Wichita.

20-23 Canadian Gas Association, annual meeting, Manoir Richelieu, Murray Bay, Que.

24-29 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, New York.

25-26 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

25-27 American Association of Cost Engineers, national meeting, Edgewater Beach Hotel, Chicago.

27-29 Automatic Control Conference, sponsored by Instrument Society of America, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, and Institute of Radio Engineers, New York University, New York.

AUGUST

5-8 American Institute of Chemical Engineers, American Society of Mechanical Engineers, national conference on heat transfer, Shamrock Hilton Hotel, Houston.

20-24 Asphalt Institute, international conference on structural design of asphalt pavements, University of Michigan, Ann Arbor, Mich.

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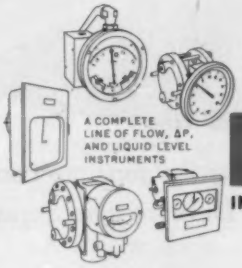

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THE JOURNAL SAID

50 years ago

December 28, 1911

The principal topic of conversation among Mid-Continent oil men is the 5-cent increase in the price of oil in eastern and Kentucky fields. The new quotation is $1.35 per barrel for most crudes. Whether or not this is a forerunner of an advance in the Mid-Continent, the possibility that it is may be a tickler that helps vastly.

The new refinery being built by The Texas Company at Lockport, Ill., is near completion. Most of the tankage, a large warehouse, and an office building already have been completed. Oil topped at the company's Tulsa plant is being moved by tank cars to the Lockport storage to start operations there.

California becomes the greatest producing state in the country. Records just issued by the United States Geological Survey show that its output of 73,010,560 bbl. the past year was 35% of the country's total.

25 years ago

December 24, 1936

Atlantic Refining Co. shuts down its refinery at Franklin, Pa. The plant, dating from 1864, was one of the first to be built in western Pennsylvania during the pioneer days of the oil industry. All of the 250 employes at the plant will be offered work either at the company's Philadelphia refinery or its new refinery to be opened soon at Atreco on the Texas Gulf Coast.

A new major field for Wyoming is indicated by a discovery by Sinclair Wyoming Oil Co. (Sinclair Oil & Gas Co.) of deep Tensleep oil production on its Wertz gas dome, near Lost Soldier, in Carbon County. Sinclair's discovery well, No. 10, flows 75 bbl. of high-grade 35°-gravity oil per hour from sand at 5,869-83 ft.

10 years ago

December 27, 1951

Magnolia Petroleum Co. sets new drilling-depth record of 17,481 ft. for South Louisiana in its 1 Ragland "D" wildcat in Allen Parish. Depth passes previous record depth of 16,237 ft. by 1,244 ft.

Controlling stock of Wilshire Oil Co., Inc., long active in California oil development, refinery operation, and marketing, is acquired by newly formed B-L & Associates, Inc. (Blyth & Co., Inc., and Lehman Brothers). Involved are oil-producing properties not only in various California fields, but also in Upton and Scurry counties, in West Texas; a 22,500-bbl. refinery at Norwalk, Calif.; related storage facilities; pipelines; and wholesale and retail distribution facilities.

JOURNALLY SPEAKING

Reflections at Christmastime

CHRISTMAS is a good time to talk about Christianity, ideals, and oil.

A number of readers have criticized recent Journal editorials on marketing which suggested that the industry should follow a civilized live-and-let-live philosophy instead of the dog-eat-dog rule of the jungle.

Our critics contend that competition is the essence of the American way of life, that competition means dog-eat-dog, and that anything less is illegal.

We think they overlook some things.

Western civilization is based on three great ideals: the Christian ethic, the democratic form of government, and the competitive economic system.

All three of these have to dovetail together, to complement and temper each other, to constitute the American way of life.

The Christian ethic is epitomized by the Golden Rule: Do unto others as you would be done by. Most of us find it hard to carry this to such extremes as turning the other cheek and walking the extra mile. But most of us do incorporate a considerable degree of decency and fair play in our social and business dealings.

The democratic form of government means freedom for the individual and rule by the majority but with respect for and protection of the rights of minorities.

Freedom has always been a relative term; liberty is not license. Under our democratic form of government we are not free to do anything we please; we must exercise our freedom with restraint, and in ways that do not unduly infringe the freedom of others. Hence we submit to self-imposed restrictions on conduct ranging from armed robbery to parking by a fireplug.

The competitive economic system assumes that a nation will prosper most if men are free to compete against each other for hope of profit. But always there have been rules to keep competition within the bounds of fair play, such as enforcement of contracts and prohibitions on short weight and misrepresentations.

Competition has never been completely free in the literal, dog-eat-dog sense; democracy, i.e. public opinion, which sanctions the existence of the competitive system of economics, has always insisted on rules to keep competition from being too ruthless.

Thus the Golden Rule tempers democracy, and democracy tempers competition. Without this tempering, pure democracy, or pure competition, would be synonymous with anarchy. It is the Christian ethic that has raised civilization above the rule of the jungle.

Such was the thinking underlying the Journal's editorials deploring individual practices which, if followed by all, would be bad for the industry, weaken the nation's strength, and threaten the continuance of our competitive system.

We do believe in the competitive system of economics, but we believe that if competition is to be a system, and be economic, it must be something above the rule of the fang; must comply with the methods of our democratic form of government; must conform to the principles of our Christian ethic.

It is true that the laws of the land proscribe certain methods for lessening the harshness of competition. But we do not believe that a statute against combinations in restraint of trade intended to, or can, repeal the Golden Rule, or the principle of the greatest good for the greatest number.

If this sounds like what you hear from the pulpit on Sundays, so be it. This is the day the Western World marks the founding of one of the three bases of its civilization.

—Henry D. Ralph

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A pious wish or a harsh warning?

SOME SECOND THOUGHTS should be given to the address of John M. Kelly, Assistant Secretary of the Interior for Mineral Affairs, before the recent meeting of the Interstate Oil Compact Commission.

The domestic producing industry, he said, can better compete with foreign oil if state conservation regulations would do more to foster the application of technology, particularly through unitization, early pressure maintenance, and wide well spacing.

This is old stuff. Others have said the same for years. If the Honorable Secretary traveled all the way from Washington just to add his individual voice to the chorus, it was a nice gesture. Was it more than that?

READ BETWEEN THE LINES. Kelly seems to be hoping that his friends in the oil business will get a message that he didn't want to put in black and white.

It could be a threat of federal control of production practices if, in the opinion of Washington, state conservation regulation is inadequate. Certainly some of his predecessors in the Interior Department have advocated such a course.

Or it could be a warning that coming events, which he can't yet disclose, will abruptly bring the industry up against the bitter fact that it is not as efficient as it must become and that the remedy is to slaughter some of the sacred cows that have stood in the way of technological progress.

Remember that Kelly is in charge of the imports program and that shortly before his speech the White House had killed his plan and ordered a new study of the relationship of oil to national-defense objectives. And the very next day his boss, the President, made a speech announcing that tariffs and trade restrictions will no longer be permitted to shelter inefficiencies that keep the United States from being competitive with other nations.

Was Kelly warning the industry that its protective umbrella of import quotas is about to be punctured or even furled? Several related happenings strengthen the belief that such was his message.

A FEELING EXISTS in Washington that import control has not achieved the objective of building a healthy producing industry because producers used it as a crutch while continuing unhealthful habits.

There are grumblings that much of the cost spread between U. S. and foreign oil is due to inefficiencies here, and that the domestic industry has not done all that it might do to eliminate the things that make it a high-cost industry.

John Kelly, himself an oil producer, listed some of the things that can cut production costs. He must have had a special reason for doing so.

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The bright spots in oil are abroad

Reserves in the free world are up 3% this year, and the bulk of the gain is in North Africa. Outlook for 1962: still more growth in reserves and production — with no slackening in demand.

Paul Swain
International Editor

THE Eastern Hemisphere is still the glamorous half of the oil world.

And particularly glamorous at the moment are the Middle East and Africa.

For a business that seems to be loaded with problems at almost every turn, free world's oil industry winds up 1961 and prepares for 1962 in pretty good statistical shape.

With 15 years of unprecedented expansion behind it, and faced with the prospect of supplying an even more massive demand for energy in the next 15, the industry today may not be quite so "overexpanded" as some observers think.

None of the major problems facing the industry was solved in 1961. Some of them—like government interference—became a little more acute. Others—like a surplus supply potential and fiercer competition—will probably become even more acute next year.

Here's how the free-world industry winds up 1961:

• **Reserves** are up about 3% with the new fields of North Africa furnishing the bulk of the increase. Other new reserves were added in what now appears to be the Middle East's almost inexhaustive oil supply. U. S. oil reserves also increased, but in other established producing regions of the world, reserves registered a slight decline.

• **Production** shows a healthy increase of over 6% over the previous year. Again, new African fields account for the most startling rises, primarily because they are now moving from a purely exploratory stage into actual production.

This trend will continue into 1962 as more fields are added to commercial production. The Middle East continued its upward trend in production, but not at the same rate as in previous years, reflecting the influence of the new African oil supplies.

• **Refining capacity** increased 6.3% in the past year, just about maintaining the surplus-capacity cushion it has had relative to production in the past.

The free world's crude production this year was just under 80% of the available refining capacity. This certainly does not represent a dangerous surplus of refining capacity, but new refining projects in almost every area of the world may worsen this situation in the next few years, particularly if world-wide demand should slacken. The industry obviously does not expect this to happen.

Western Hemisphere. As an oil region, the Western Hemisphere winds up 1961 with fewer startling developments than any other part of the world.

Additions to reserves were less than 1%, with most of that furnished by the United States. Venezuela marks its first decline in reserves since this country became the bellwether of the Latin American oil industry. The slight decline in Venezuelan reserves reflects a continued high crude production with practically no exploration activity to add to the ultimate supply.

Other Latin American oil producers such as Argentina, Bolivia, Chile, Mexico, and Trinidad all accounted for small additions to reserves and, at the same time, increased oil production. Argentina's production is up 44% over last year, easily the biggest gain of

Jersey plans record spending in '62

STANDARD OIL Co. (N. J.) plans capital expenditures next year of nearly $1,200 million, topping the 1957 record of $1,131 million.

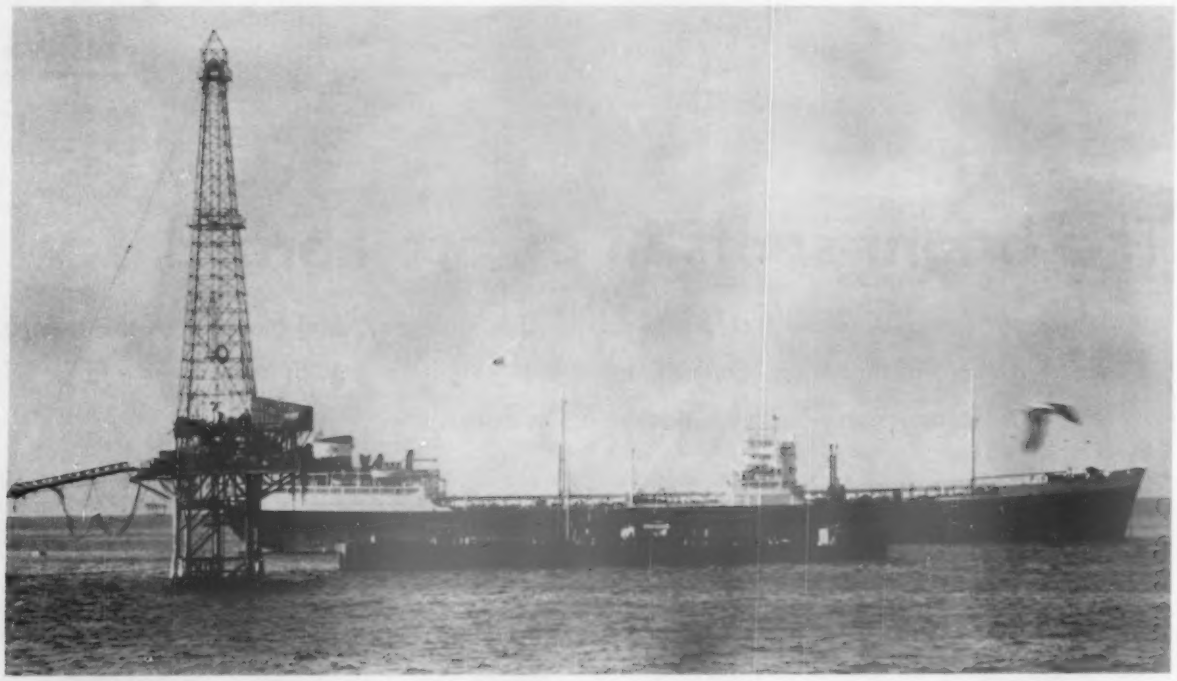
In a year-end statement, President M. J. Rathbone said "very substantial levels of capital investment" are needed to support the expanding world markets for products.

He predicted a growth in demand abroad next year of between 6 and 7%, compared with a U. S. gain of 2 to 3%. For the entire free world, Rathbone said the rate of increase in the next few years is expected to be between 4 and 5%.

Of Jersey's record capital investment, 43% will go into production, 25% into refining and petrochemicals, 20% in marketing, and 12% in transportation and other uses.

In addition to the $1,200 million, Rathbone said Jersey expects to spend $200 million on exploration next year, half in the U. S. and half abroad. Research spending will total about $80 million, he said.

Rathbone said 1961 has seen Jersey set world-wide records in production, refinery runs, and product sales, with earnings up for the third straight year. Crude-oil output rose more than 8%.



BIGGEST NEW WELL is this Pan American Oil Co. discovery in the Persian Gulf off Kharg Island, the Darius No. 1. Early testing was hampered by lack of storage. The spectacular well—with a chartered tanker to hold its production—is now being tested more fully and has flowed at rates up to 35,000 bbl. daily. Operating company is Iran Pan American, owned jointly by Pan Am and National Iranian Oil Co. It holds 4,000,000 acres in the Persian Gulf off Iran.

any country in the Western Hemisphere.

Production for the entire hemisphere, however, rose only about 425,000 bbl. daily in 1961.

Refining in the Western Hemisphere also reflects this stability. Only five new refineries were built in this area during the last year and a total of 400,000 bbl. daily was added to refining capacity.

Europe. With less oil of its own than any other major area of the world, Europe is and will continue to be one of the fastest growing oil markets as its energy needs increase. The trend is still away from coal and toward oil.

Europe added less than 1% to its relatively small oil reserves during the past year, but it chalked up a healthy 9.5% increase in production of indigenous oil.

Yugoslavia accounts for almost the entire increase in reserves and this "communist-but-neutralist" country had a 44.5% increase in its daily production. Other production increases were in West Germany, France, the Netherlands, and in the small producing industry in the English midlands.

European refining capacity is up roughly 10% with the addition of 445,000 bbl. daily of new throughput capacity. This will increase at an even faster rate as new plants now on the drawing boards or under construction are added to Europe's refining roster. Most of this new construction is planned for West Central Europe and will be served by new pipelines to move imported crude to new and expanded inland refining areas.

Africa. The Dark Continent, in the recent past only a market for oil, is coming into its own.

African reserves increased almost 20% in the past year and new estimates of African oil potential are probably too conservative.

Production in Africa in the past year increased a whopping 70% and would have been even greater had not Saharan oil output been cut back by the shutdown of a pipeline through Tunisia during the French-Tunisian dispute over the Bizerte naval base.

This year's production increase will be dwarfed by the steadily rising output in 1962. Libya's first pipeline from Zelten field was completed late this year. It will be in full operation in 1962 and will be joined by a second big-inch line feeding more Libyan crude into world markets from several fields developed by Oasis Oil Co.

In addition to these North African developments, Nigeria is on a steadily rising trend as its relatively recent discoveries are developed. Nigerian production, now well over 40,000 bbl. daily, increased 142% during the past year.

African refining capacity jumped almost 15%, and this area is still in the refining fledgling stage. Half a dozen new plants planned for widely scattered areas of Africa will push capacity higher.

Far East and Australasia. This part of the world moved even further into a refining and marketing class during the last year because there were no significant exploratory or producing developments in Indonesia, the area's primary oil source.

Oil reserves were down. The drop was less than 1%, but it was a decline and it was due to the dropping production in some of the world's oldest oil fields and an almost complete lack of any new exploratory work in older producing areas.

It is still far too early to evaluate properly the new discovery in Aus-

tralia, but the commercial well being completed in Queensland is apparently going to make Australia an oil producer at long last (p. 99).

Production in Australasia rose 3% despite a sharp drop in British Borneo's declining fields.

The region's 33% increase in refining capacity was sparked by the almost explosive increase in the Japanese refining industry. Japan now has more than 1,000,000 bbl. of capacity, and a dozen more plants are planned for the next 3 years or are already under construction.

Middle East. This prolific oil area continues to be the glamor girl of foreign oil.

Middle East reserves, already the largest of any oil producing area in the world, increased slightly less than 3% during the last year with every producing country in the area except Iraq adding to the increase. The dispute between Iraq's Premier Kassim and Iraq Petroleum Company halted all exploration work.

Production in the Middle East rose 8.8%.

NEW OIL COUNTRY is Australia, where Union has brought in a significant oil discovery. Well above is the Etonvale No. 1 in Queensland, about 600 miles from Brisbane, which this week is drilling below 8,000 ft. toward a target of about 12,000. Phillips Petroleum Co. is operator, and Sunray Mid-Continent is a major participant.

Gas men object to FPC's "quality" proposal

IF THE Federal Power Commission decides it must establish standards for "pipeline quality" gas, it should do so on an area or field basis and only after area-price hearings have been completed.

This was the gist of most of the comments made to FPC as a result of the agency's November request for further comment on a rule proposed last May.

In the May proposal, the FPC had announced that it was considering a rule establishing minimum quality, pressure and delivery provisions to be used as standards in determining when natural gas is of "pipeline quality."

It indicated at that time that price adjustments downward from area prices would be made for gas failing to meet the standards, but upward price adjustments would not be made for gas above standard.

The proposed rule raised a storm of protest from producers, who termed the proposal unnecessary and unfair. For one thing, they said, prices negotiated between buyers and sellers had already taken quality differences into consideration and further adjustments by FPC would result in double penalty.

In its November invitation for further comment, FPC said it appeared that some in the industry were under the impression that the agency was proposing a single, nationwide standard for pipeline quality and were therefore concerned over the possibility of a double penalty.

FPC said that it had not been its intent to establish a nationwide standard, and called for comment and suggestions on possible deviations to be considered to take into account variations by areas.

In response to the second invitation, producers and others last week supplemented comments they had filed earlier.

Most of those commenting still strongly object to a "pipeline quality" standard whether it is nationwide or areawide. They said such variable and technical matters should be left to negotiation between pipeline companies and producers.

"The standards you are trying to set are not do-able," Emby Kaye of Tulsa wrote. "One cannot set standards for variables."

Several others said that if there is to be a quality standard, it should be set only after area-price hearings have provided data to enable the commission to set standards for a specific area.

Phillips Petroleum Co. challenged FPC's implication that establishment of area, rather than nationwide standards would eliminate the danger of a double penalty.

"The double penalty would not arise from the fact that any proposed price adjustments were nationwide in character but from the fact that any further price adjustments were made to prices which already include substantial adjustments for difference in quality," Phillips said.

The West Central Texas Oil and Gas Association said the rule would have the general effect of discouraging exploration in shallow, low-pressure, low-reserve areas where small, independents usually operate.

FPC last week extended the period for comment from December 20 to January 4.

API sums up '61: better, but not much

Year-end figures show what oil men already knew: it was a dull year.

Biggest surprise in the figures: a gain of only 2% in gas production.

SLIGHT INCREASES have been recorded in most phases of U. S. oil-industry operations during 1961, with the rate of growth generally falling well below that of the previous 2 years.

Here are the statistical highlights as presented in the American Petroleum Institute's annual review:

Domestic demand: up from 3 billion 536 million barrels in 1960 to 3 billion 577 million, or from 9,661,000 to 9,801,000 bbl. daily. On an annual basis, the increase over the 1960 leap-year total was 1.17%; the daily average increase was 1.45% compared to 2.2% in 1960 and over 4% in 1959.

Crude-oil production: up 2% from 7,035,000 to 7,186,000 bbl. daily.

Gas-liquids production: up 5% from 930,000 to 982,000 bbl. daily.

Imports: up 3.6% from 1,815,000 to 1,880,000 bbl. daily.

Exports: down 14.4% from 202,000 to 173,000 bbl. daily.

Natural-gas production: up only 2% from 41.2 to 42.1 billion cubic feet daily in sharp contrast to the previous year's increase of almost 6%. The slackened growth rate was attributed largely to lower industrial demands in the early part of this year.

Drilling: roughly the same as last year's lower level, with estimates (including figures from The Oil and Gas Journal) of 46,725 completions in 1961 compared to 46,810 in 1960 and 51,812 in 1959. Footage dropped slightly from 190.7 million feet to 189.5 million feet. Dry holes and oil completions are down and gas-well completions up.

Product consumption. The best showing among the major refined products is being made up by distillate fuel oil, with an estimated increase of 3% with the help of a late-season pickup.

Gasoline, on the other hand, is up only 1.5%, as last-half gains offset an unusually poor second quarter. This gain in consumption is about the same as 1960, but less than half the 3.4% increase recorded in 1959. API cited smaller and more economical cars as important factors in the flattening gasoline-demand curve.

Residual-fuel-oil demand continued its decline, with this year's drop exceeding 3% compared to about 1% the year before.

Inventories. Product stocks presented one of the brighter spots of the industry's year-end picture, although they are still considered fairly heavy.

Stocks of finished and unfinished gasoline are down about 5½ million barrels from the 1960 year end to just above 189 million barrels. The reduction is attributed to refinery cutbacks resulting from Hurricane Carla and the summer maritime strike. Stocks of distillate and residual fuel oils also are down.

But crude stocks have increased about 8 million barrels, and will end the year at 248 million barrels, in contrast with the decrease of 17 million barrels for the previous year. Higher production and imports were factors in the increase.

Estimated crude runs to stills increased just over 1% from 8,067,000 to 8,175,000 bbl. daily.

Only consolation in the API figures is the suggestion that matters could have been worse. Demand early in the year was well below expectations, and only a pickup in the closing months made 1961 as good a year as it was.

API's year-end look at 1961 supply and demand

(Thousands of barrels daily)

	1961	1960	1959
Crude oil production	7,186	7,035	7,053
Nat. gas liquids prod.	982	930	880
U. S. domestic supply	8,168	7,965	7,933
Imports	1,880	1,815	1,780
Exports	173	202	211
Domestic demand	9,801	9,661	9,451
Percentage change	+1.45	+2.22	.....
Total demand	9,974	9,863	9,662
Percentage change	+1.13	+2.10	.....
Natural gas (gross prod., M.M.c.f.)	42,071	41,224	38,984
Percentage change	+2.05	+5.75	.....

API's estimates of four major products

(Thousands of barrels)

	1961	1960	1959
Gasoline			
Production	1,516,800	1,522,497	1,488,860
Domestic demand	1,531,200	1,511,670	1,485,277
*Percentage change	+1.57	+1.50	.....
Distillate fuel oil			
Production	692,700	667,050	678,938
Domestic demand	705,200	685,268	659,983
*Percentage change	+3.21	+3.54	.....
Residual fuel oil			
Production	314,700	332,147	347,900
Domestic demand	540,900	559,439	563,464
*Percentage change	—3.07	—0.97	.....
Kerosine			
Production	141,400	135,772	110,662
Domestic demand	146,000	132,499	109,919
*Percentage change	+10.50	+20.27	.....

*Calculated on daily average basis.

Source: 1959-1960, Bureau of Mines; 1961 estimated on basis of first 9 months data of Bureau of Mines and subsequent weekly reports of the API.

'62 demand to rise 3%, Bureau of Mines says

NEXT YEAR'S increase in demand will more than double that of 1961, the Bureau of Mines believes.

Both total and domestic demand should rise 3% in 1962, the bureau said last week, compared with a gain of a little less than 1.2% this year.

Biggest gain is expected to be in kerosine, with demand going from 394,000 to 435,000 bbl. daily—a jump of 10.4%. Demand gains for gasoline and distillate fuels were estimated at 2.4%.

For producers, the bureau predicted a need for 8,283,000 bbl. daily. Within this figure, the bureau estimated a 1.4% increase for crude oil and 2.9% for gas liquids. It noted that imports are expected to rise by about 59,000 bbl. daily.

Bureau's forecast of supply and demand

(Thousands of barrels daily)

	1961*	1962	% change
SUPPLY			
Production	8,156	8,283	1.6
Crude oil	7,178	7,277	1.4
Natural-gas liquids	978	1,006	2.9
Imports	1,889	1,948	3.1
Crude oil	1,055	1,068	1.2
Refined products	834	880	5.5
New supply	10,045	10,231	1.9
Stock change	+96	−15	...
Crude oil	+29	....	...
Natural-gas liquids	+17	+ 5	...
Refined products	+50	−20	...
DEMAND			
Total demand	9,949	10,246	3.0
Gasoline	4,224	4,330	2.5
Kerosine	395	437	10.6
Distillate fuel oil	1,926	1,978	2.7
Residual fuel oil	1,518	1,564	3.0
All other	1,886	1,937	2.7
Exports	174	175	0.6
Crude oil	8	5	−37.5
Refined products	166	170	2.4
Domestic demand	9,775	10,071	3.0
Gasoline	4,199	4,300	2.4
Kerosine	394	435	10.4
Distillate fuel oil	1,906	1,952	2.4
Residual fuel oil	1,480	1,524	3.0
All other	1,796	1,860	3.6
Crude runs to stills	8,174	8,316	1.7

*Partial estimate.

Humble fencing in wild Galveston Bay well

HUMBLE Oil & Refining Co. is spending $250,000 to erect a 3,000-ft. fence around a wild gas well in Galveston Bay.

The purpose of the steel sheet-piling structure is to prevent contamination of bay waters.

The unusual project has been undertaken even though the company is not certain that the burning gas column is actually causing the pollution noted by fishermen in the area.

Humble is drilling an 11,600-ft. directional well into the gas reservoir to kill the blowout but won't complete this job for another month or so. The steel fence will be erected in another week.

The fence consists of 45-ft.-long sheets of steel strips which will extend 6 ft. above the 9-ft.-deep water and 30 ft. into the ocean floor. When completed it will contain any liquids given off by the well.

The well in Red Fish reef field blew out October 22 (OGJ, Oct. 30, p. 117).

An effort to kill the wild well by deepening a nearby well and injecting fluids into the reservoir was unsuccessful. Falcon Seaboard Drilling Co. is doing the drilling.

Replying to complaints of fishermen that the bay waters were being polluted, John S. Bell, Humble's Houston area manager, said the company took full safety precautions immediately after the blowout. Among other things it placed a circle of floating drums around the wellsite, and no sign of escaping oil was detected within this temporary barrier.

Bell said some of the pollution may have been caused by Hurricane Carla, which ruptured oil storage tanks and broke oil flow lines.

OCAW delays signing new Gulf contract

GULF Oil Corp. and the Oil, Chemical and Atomic Workers Union have reached agreement on a new contract at the Port Arthur, Tex., refinery, but striking machinists have turned down a company offer because it contained no guarantee against outside contract work.

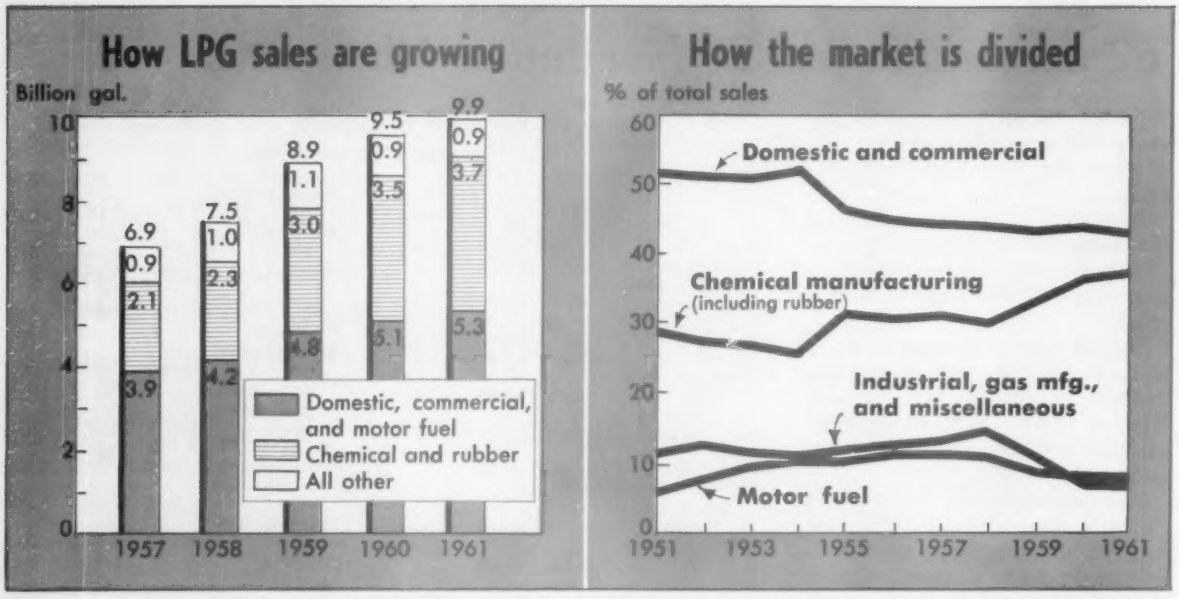
Agreement with the OCAW does not necessarily mean that the 3,000-plus members will return to work at the big refinery, now being operated at half-capacity by supervisors. The union was still debating last week whether to sign the agreement.

OCAW's problem: if the agreement is signed, the OCAW members must decide individually whether to cross the picket lines of the machinists and return to work. This would produce confusion and embarrassment in the union ranks, and union leaders want to avoid the issue if possible.

OCAW obtained a satisfactory job-security clause in its negotiations with Gulf. This had been the major stumbling block. The clause states that the company will give 60 days notice of any intended layoffs and will sit down with the union to discuss methods of softening the effects of the layoffs.

Negotiations with nearly 200 members of the International Association of Machinists have proved tougher. Gulf has refused to give up its right to contract out work. The union turned down a company offer of a new contract but will continue to negotiate.

The machinist strike began October 22. The OCAW then cancelled its contract with Gulf and observed the machinist picket lines.



It's another record year for LPG sales

LPG sales this year are running 3.7% ahead of 1960.

This is far below the 10.5% gain racked up last year but still is impressive in the face of a general slowdown in the growth of U. S. oil-industry operations. API's year-end review shows domestic demand for all oil products rose only 1.17% this year (p. 84).

Prolonged mild weather, further inroads by natural gas into LPG markets, a delay in new housing starts, and a sluggish first half in the chemical-processing industry helped hold down this year's LPG sales.

But there is nothing to indicate the LPG industry is headed into a prolonged slump. The outlook is for continued good growth rates.

These conclusions are drawn from the annual year-end review of the LPG industry made by George R. Benz, W. F. DeVoe, and A. F. Dyer of Phillips Petroleum.

Other highlights:

LPG production outstripped demand in 1961 because more natural gas was processed and refineries stepped up output of light ends. Fifty-six new plants and 18 major expansion programs completed within the year boosted production capacity 3,864,000 gal. per day.

As a result of this oversupply,

Quarter-century trend in liquefied petroleum gas sales

(Millions of gallons)

Year	Total Vol.	Total % increase	Domestic and commercial* Vol.	Domestic and commercial* % increase	Motor fuel Vol.	Motor fuel % increase	Industrial and Miscellaneous Vol.	Industrial and Miscellaneous % increase	Gas Manufacturing Vol.	Gas Manufacturing % increase	Chemical Mfg. Vol.	Chemical Mfg. % increase
1925	0.4	...	...	...	...	...	...	...	...	...	...	...
1930	18	...	12	...	...	...	2	...	4	...	...	...
1935	77	...	21	...	...	...	48	...	8	...	...	...
1940	313	...	134	...	...	...	124	...	20	...	35	...
1945	1,277	...	533	...	...	...	257	...	54	...	433	...
1950	3,483	...	2,022	...	†130	...	226	...	252	...	852	...
1951	4,227	21.4	2,167	7.1	290	123.4	269	19.4	282	11.9	1,220	43.2
1952	4,477	5.9	2,266	4.6	371	27.8	339	25.8	260	− 7.8	1,242	1.8
1953	4,932	10.2	2,479	9.4	498	34.5	374	10.4	222	−14.4	1,358	9.3
1954	5,126	3.9	2,627	6.0	547	9.8	402	7.3	192	−13.7	1,358	...
1955	6,123	19.5	2,801	6.6	652	19.1	‡556	38.5	214	11.4	§1,899	39.8
1956	6,636	8.4	3,001	7.1	773	18.7	630	13.3	212	− 0.7	2,019	6.3
1957	6,939	4.6	3,067	2.2	805	4.1	¶685	8.7	231	8.9	2,150	6.5
1958	7,462	7.5	3,294	7.4	852	5.9	806	17.7	239	3.4	2,271	5.6
1959	8,919	19.5	3,935	19.5	890	4.4	871	8.1	183	−23.4	‖3,040	33.9
1960	9,545	7.0	4,225	7.4	898	0.9	707	−18.8	157	−14.2	3,558	17.0
1961 (est.)	9,895	3.7	4,352	3.0	925	3.0	741	4.8	141	−10.2	3,736	5.0

refiners used more LPG as fuel, and producers built more storage.

Consumption of LPG as refinery fuel rose 20% over 1960. Refrigerated-LPG storage capacity increased 6 million gallons this year. Total underground-storage capacity reached a record 3 billion gallons.

Fastest-growing market for LPG still is petrochemicals although the volume used in making rubber components fell 9% because of a generally lower level of business.

Looking ahead:

Lower transportation costs should improve LPG's competitive position. The Dixie LPG line from Texas to North Carolina will go into operation soon. Use of new 30,000-gal. "short" tank cars, which have no underframe, will save on rail freight charges.

LPG appliance sales are expected to pick up in 1962.

Use of high-purity LPG as a propellant in pressurized containers of shaving cream, paint, and deodorizers is likely to increase.

Natural-gas utilities will install more LPG facilities for peak-shaving operations.

Use of LPG in secondary recovery of crude likely will continue to decrease. LPG injections were down considerably from 1960, and no large-scale miscible floods were started during the year. Miscible flooding is losing favor because oil recoveries are smaller than anticipated (OGJ, Dec. 11, p. 43).

*Householheating and other household and farm uses. Included also is LPG sold by domestic distributors but used for commercial or industrial purposes.

†For all years prior to 1950, motor-fuel volumes are included in industrial and miscellaneous volumes.

‡Includes more complete coverage of refinery fuel.

§Includes more complete coverage of LPG-mixture streams containing ethane and methane.

¶Includes volume used in secondary recovery of petroleum.

‖Includes more complete coverage of ethane and/or ethylene and mixtures.

Note: Total sales except in 1961 obtained from Bureau of Mines. Total sales volume excludes LPG used in manufacture of gasoline and excludes pentane sales after 1944.

WATCHING WASHINGTON

with Clyde La Motte

OEP makes haste slowly in launching oil-import study

THERE still isn't much shape to the oil-import study being directed by the Office of Emergency Planning.

At this stage no one seems to have a very definite idea of what ground is to be covered or factors to be considered.

First meeting of the interdepartmental committee doing the study was held last week but accomplished little. A second meeting is planned for early January.

It's a good bet that some fire will be built under OEP when Congress gets back in session.

Meanwhile, there is a persistent rumor that OEP Director Frank B. Ellis may not be at OEP much longer. It's known that he's interested in a federal judgeship, but may be offered some other administrative post instead.

Fifth seat at FPC may remain vacant until midyear

JEROME KUYKENDALL is gone from the Federal Power Commission, but his chair may not be filled for at least 6 months.

Had he stayed on the commission, his term would have expired next June. Therefore, rather than appoint someone to the remainder of the current term, it appears probable that President Kennedy will wait and make a full-term appointment next spring. That would permit time for Senate confirmation before the new term begins. Meanwhile, FPC will operate with a 4-man commission.

Another study of soviet economic moves is planned

THERE will be an announcement shortly of still another study of the impact of soviet trade policies, including those affecting oil.

The study is to be made by a subcommittee of the National Planning Association's international committee. It will analyze soviet economic penetration in the free world and will recommend public and private policies it feels are needed to deal with the soviet threat.

J. K. Evans, now a private consultant on international business and also executive director of the Independent Fuel Oil Marketers Association, is chairman of the NPA subcommittee. The 30-man group includes 5 oil-industry officials: George Parkhurst, Standard Oil Co. of California; Cedric W. Lutz, Gulf Oil Corp.; Francis McIntyre, California-Texas Oil Co.; George Piercy, Standard Oil Co. (N. J.); and John H. Lichtblau, Petroleum Industries Research Foundation.

First meeting will be in January. Plans are for completion of a preliminary report in 2 months.

There will also be a meeting January 9 of the soviet oil committee appointed by the National Petroleum Council at the request of the Department of Interior. Membership of the committee, which includes top names in the industry, was announced recently (see p. 236).

Senate Fuels-Study staff hopes to make an early report

THE STAFF of the Senate Fuels-Study Committee expects to have something ready for committee consideration by late January or early February.

This group has been working without fanfare or public hearings, but its findings may carry more weight in the long run than some of the noisier investigations.

Sun is going all out for eight grades

Widespread testing convinces Sun that its best bet in today's market is to drop the lowest of its nine grades, and price its 190 even with Gulftane and a cent above independents. Next month the change will hit 23 states.

BEGINNING next month Sun Oil Co. will market eight grades of gasoline via a blending pump throughout its 23-state territory in the East, Southeast, and Great Lakes.

This is Sun's answer to Gulf Oil Corp.'s subregular Gulftane, to private-brand price competition, and to the problem of tailoring motor fuels to actual car needs.

Sun's announcement came at a time when signs of stability were beginning to show in most of the nation's retail gasoline markets (see story below).

Sun's decision to go all-out for eight grades means that:

A 6-year period of experimenting, first with six grades, then with nine, and during recent months with eight grades, is over. Test results indicate this is the most effective means of coping with the current competitive situation, and action in the fall showed Sun was obviously leaning in this direction.

Quality will range from about 92 or 92.5 research octane number for Blue Sunoco 190, to 102 RON for the top grade, 260. The lower octane material is mixed at the pump with the superpremium to formulate other grades.

Grades will be priced 1 cent apart, with 190 being 1 cent below Sun regular and that of other majors, even with Gulftane, and usually 1 cent above private brands. The ninth grade, 180, which became the focal point for price wars in test markets when it was priced even with private brands, is being dropped.

Sun's dual-brand Cent-A-Grade operations, selling nine grades in a corollary to its branded experiments, will be continued in spite of the decision in favor of eight grades for all branded sales.

Evolution of policy. Sun started marketing six grades through a custom-blending pump in Florida in 1956.

This was soon after the advent of superpremium third grade created for the high compression-ratio cars which produced the octane race of the 1950's.

The blending pump, Sun believed, offered the best solution to a complex problem: suiting gasoline to car requirements, including those of very high octane, without the distribution and storage costs for several grades.

In 1958, the blending pump was installed throughout Sun's territory.

In October of 1961, Sun began the Cent-A-Grade experiment that was to spawn a widespread trial of the full nine grades which the pump was capable of dispensing. Volume spurted sensationally—98% at the first station, according to Sun—with the bottom two grades priced 1 and 2 cents below regular, and the lowest even with private brands.

The Cent-A-Grade test spread from the original location at New Castle, Del., to Morrisville, N. J.; Revere, Mass.; Providence, R. I.; Royal Oak, Mich.; Louisville, Ky.; and Pittsburgh.

In May, the nine-grade system was introduced in Charlotte, N. C.; and during an ensuing scrap, prices reached historic lows. It was tried later at Norfolk, Va., and Buffalo, N. Y., battling Gulf's combat grade, Gulftane, with similar results.

Then the system was extended to Fort Wayne, Indianapolis, and Chicago, but without the controversial 180, and Sun began riding 1 cent above private brands. The 180 disappeared from all points but Buffalo in recent weeks, presaging last week's announcement that the eight-grade approach was being adopted for all Sun stations.

Since the inception of the blend-

Gulftane thrust into New York,

"THERE seems to be a Christmas moratorium on price cutting."

With that terse comment one eastern oil marketing executive pretty well summed up the situation in the nation's retail gasoline markets.

Prices generally have improved. They're less volatile. Both major and private-brand retailers are hesitant to slash prices. But this peaceful coexistence may be short lived.

The New York metropolitan area braced last week for the entry of Gulf Oil Corp.'s economy regular, Gulftane. Chicago expects Gulftane sales to start there shortly after January 1. What happens in these two huge markets may well set a new pattern.

Service-station storage was being filled to enable Gulftane sales to begin before Christmas in Manhattan, the Bronx, and Long Island. Stakes here are bigger than in any market yet invaded by Gulftane.

The effect in New York City, because of sign restrictions, was expected to be small. But the more volatile and much bigger Long Island market may be quite another story. Marketers there foresee the possibility of an end to the relative calm that has attended spread of Gulftane in much of the East in recent weeks.

When Gulftane entered its first markets, it was priced 2 cents under major-brand regular gasoline and even with independent brands. Prices immediately hit the skids when both majors and independents cut. Lately, however, the majors have cut their regular gasoline to 1 cent above Gulftane and independents have remained even.

Some marketers predict this pricing pattern may stick until one company starts to losing a lot of volume. Then price cutting may resume.

New areas receiving Gulftane last week were: East — Johnson City,

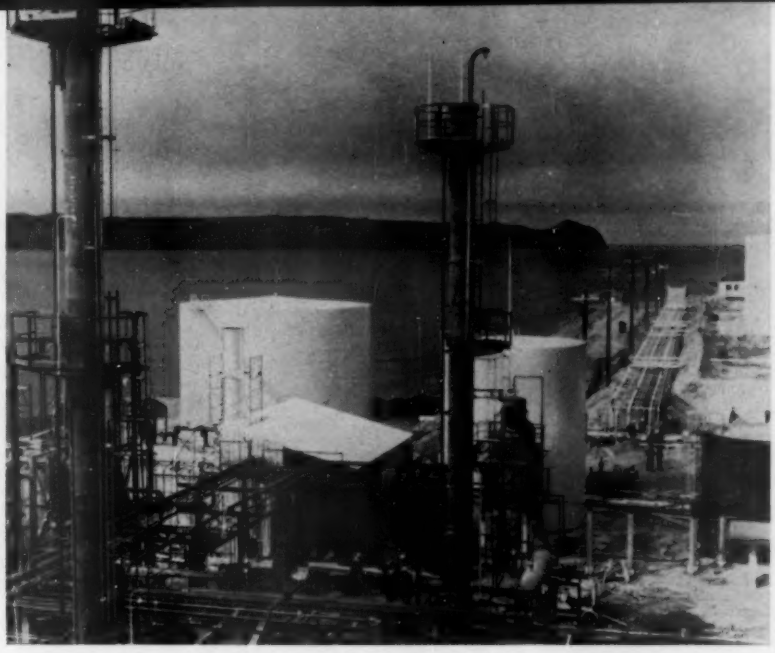
ing pump, marketing emphasis has shifted from the superpremium to economy, with the further rise of the private brander and the new public fancy for small cars.

Eight grades the answer? Sun has not been immune to the inroads of private brands and major competitors.

Sun gasoline sales have declined slightly for 4 consecutive years, although the last 3 years have been almost steady after the falloff from the Suez-inflated columes of 1956-57. But Sun says sales have increased everywhere eight and nine grades have been sold.

Results apparently indicate Sun can prevent private-brand drainage with a 1-cent differential, and without the turmoil attending on-the-nose pricing. And the eighth grade gives Sun a weapon against Gulftane, which will soon be sold throughout Gulf's territory, including all Sun's states.

Of some 40 marketers selling three or more grades of gasoline, Sun is the only one using the eight-grade approach. Signal Oil & Gas Co. sells nine grades, and El Paso Natural Gas Products Co. sells six. Others market three grades.



New Canadian plant on stream

AN 8,000-bbl. refinery was dedicated recently at St. John's, Newfoundland.

The new plant is operated by Golden Eagle Refining Co. of Canada, which was organized in 1960 as a joint venture of Ultramar, a British firm, and Canadian Caribbean Oil Co., Ltd., a Bahamian firm.

Golden Eagle will run Venezuelan crude in the new plant. A tanker terminal adjacent to the plant has 560,000 bbl. of crude-oil storage. The company has a few retail outlets in the area and plans more.

Chicago may force new gasoline price pattern

Prices of major-brand regular gasoline

	Dealer's net price	Taxes	Pump price
Boston	16.4	9.5	25.9
New York:			
Lower Manhattan	25.9	10.0	*35.9
Upper Manhattan	23.9	10.0	*33.9
Buffalo	13.9	10.0	23.9
Philadelphia	18.9	11.0	29.9
Pittsburgh	19.9	11.0	30.9
Norfolk	16.9	11.0	27.9
Atlanta	21.4	10.5	31.9
Miami	18.9	11.0	29.9
New Orleans	12.9	11.0	23.9
Memphis	15.9	11.0	26.9
St. Louis	20.4	10.5	30.9
Chicago	21.9	10.0	31.9
Indianapolis	18.9	10.0	28.9
Cleveland	20.9	11.0	31.9
Houston	20.9	9.0	29.9
Dallas	20.9	9.0	29.9
Fort Worth	20.9	9.0	29.9
Tulsa	21.4	10.5	31.9
Kansas City	20.9	11.0	31.9
Des Moines	21.9	10.0	31.9
Minneapolis	20.4	9.0	29.4
Milwaukee	21.9	10.0	31.9
Denver	19.9	10.0	29.9
Phoenix	15.9	9.0	24.9
Albuquerque	16.9	10.0	26.9
Cheyenne	24.9	9.0	35.9
Salt Lake City	22.9	10.0	32.9
Los Angeles	19.9	10.0	29.9
San Francisco	21.9	10.0	31.9
Seattle	19.4	11.5	30.9

*Mode price. Ranges are 28.9-37.9 for Lower Manhattan and 27.9-36.9 for Upper Manhattan.

Erie, Harrisburg, Pa.; Rochester, N. Y.; Parkersburg, Huntington, and Charleston, W. Va.; Baltimore, and Washington. Midwest — Marietta, Lima, Columbus, Ohio; Huntington, Ind., Bay City, Mich. South—Nashville and Paducah.

Meanwhile, this was the retail gasoline picture across the nation:

East—Prices were firmer in New England, Pennsylvania, and Virginia; steady in New Jersey; softer in New York. Instability prompted by Gulftane in Pittsburgh area lasted only a week.

Mid - Continent — Near normal price levels prevailed in Chicago, Milwaukee, Cleveland, Tulsa, and Kansas City. St. Louis levels softened slightly during the week.

Gulf Coast—New Orleans' prices were still unstable, major - brand regular dropping 3 cents in the week to 23.9 cents. Houston and nearly all of Texas—except San Antonio—also were steady at 29.9 cents.

Rockies — Price trouble still haunted Denver where Continental's upward move to a normal 32.9 cents didn't stick when independents held at 27.9. Result was slide back to 29.9 Albuquerque also was soft, but normal prices prevailed at Salt Lake City and Cheyenne.

West Coast—Steady at 29.9 to 31.9 for the week.

FLOATING service station, one of three Ashland operates on busy Ohio River, refuels barges in midstream.

Nonstop refueling cuts barging costs

Onshore refueling takes as long as 6½ hours. But floating filling stations can deliver diesel while customer's barge keeps moving. Savings in operating time more than offset ½-cent-a-gallon premium for midstream service.

BARGING on the Ohio River is no longer a start-and-stop operation thanks to an oil-industry innovation—midstream refueling.

A barge captain now radios or phones ahead to floating filling stations and reports the time he expects to reach a certain river point. When he arrives, the refueling barge is waiting to pull alongside and start delivering fuel and other needs.

The Ashland service barge and its floating customer keep moving on the river while the fueling job is in progress. This takes about 1½ hours. After servicing, the Ashland barge returns to its base unless it has been radioed another midstream order.

Similar re-fueling operations carried out at bank-side take about 6 hours.

Like their onshore counterparts, the floating service stations offer free fresh water. Personal needs such as razor blades and toothpaste are frequently stocked, as well as food, cigarettes, and soft drinks. Small boats are provided for transferring crews on or off the barges.

In some instances a crewman's laundry will be delivered, or his freshly cleaned suit will be waiting for him to slip into on his way toward the nearest airport and home.

For this midstream service, ½-cent per gallon is added to the diesel-fuel price. While this increases the barge boat's fuel bill about $50 (average fuel load taken on is from 8,000 to 10,000 gal.), the cost is minor compared with the savings made possible. The service actually costs Ashland about 1 cent per gallon.

Big time saver. With barge time variously valued at a few hundred to $2,000 per hour, depending on the size and content of the barge, time-out for refueling can be quite expensive. Operating costs alone are from $50 to $150 per hour.

Under the old dock-fueling system, a minimum delay of about 6 hours is involved. The barge has to slow down, the tow tied up, and the boat moved to shore. After fuel and other needs are taken care of, the tow again has to be picked up before proceeding.

An added lost-time item is loss of position in the stream of barges. In wending their way along the 990-mile stretch between Cairo, Ill., and Pittsburgh, barges must pass through more than 40 dams and locks. A refueling delay could result in additional hours of waiting to be lifted through the next lock.

Ashland's operations. Although not the first to undertake midstream refueling, Ashland Oil & Refining Co. is one of the leaders in offering the service on the Ohio.

The company has midstream refuelers stationed at Mount Vernon, Ind., Ashland, Ky., and Charleroi, Pa. All operate on a 7-day, 24-hour basis.

The refueler operating from Ashland carries a 150,000-gal. diesel-fuel tank, 4,000 gal. of bulk lube oils, 20,000 gal. of fresh water, cylinders of LPG, a complete supply of greases, and groceries and other personal items for the barge crews. Pumps aboard the barge can supply 750 gal. of fuel, 250 gal. of lube oil, and 320 gal. of water per minute.

River traffic increasing. Barge traffic on the Ohio has more than doubled in the past 10 years. Total

tonnage during 1960 was about 80 million tons, or 1½ times that moved through the Panama Canal. Busiest section on the river, as well as any of the nation's inland waterways, is around Ashland and Huntington, W. Va. During 1960 almost 27 million tons were moved over this section.

Coal and coke accounted for almost 40 million of the 1960 tonnage. Oil and petroleum products were a poor second at 16 million tons. Chemicals and sulfur accounted for an additional 4 million tons.

On a ton-mile basis, however, oil and products equaled coal and coke. Totals for each were slightly over 6 billion ton-miles. Average oil haul was 370 miles, as compared to 151 miles for coal and coke.

In keeping with the greater tonnage, size of the average barge tow is much longer today. More than half of the tows exceed 600 ft., with most of these extending 1,000 ft. Average cargo of such a tow is about 20,000 tons. Pushed by boats containing 2,000-hp. diesels, the barges average about 8 to 10 miles per hour upstream.

Higher crude prices, lower pipeline tariff set for Swanson River

STANDARD Oil Co. of California, Western Operations, Inc., last week announced an increase of 8 cents a barrel in the price it pays for crude in Swanson River field, Alaska.

The new price schedule ranges from $2.41 a barrel for 25°-25.9°-gravity crude to $3.29 a barrel for 40°-40.9°. This is 53 cents a barrel higher than postings when the field first went on production.

Kenai Pipe Line Co., which connects Swanson River field on Kenai Peninsula with a tanker terminal at Nikiski on Cook Inlet, last week reduced its tariff 8 cents a barrel—from 20 cents down to 12 cents.

Both companies said their actions reflect increased production from the field. Swanson River now is producing nearly 27,000 bbl. daily.

Higher crude prices will raise the state's oil royalties, which are figured on the basis of total production and posted prices.

MUD AND WATER can't stop seismic truck with widetrack, low-pressure tires.

Big tires open seismic trails

SHELL Oil Co. has developed an oversized low-inflation tire that will move a seismic-crew truck through lowland bogs and rain-soaked areas that heretofore were impassable.

The 24-in.-wide tire, built by Goodyear Tire & Rubber Co. to Shell specifications, is installed on a specially designed wheel for use on a modified truck that meets Texas highway regulations. The same wheel can use a conventional tire for dry-weather operations.

In a field test the Shell truck equipped with the Terra-Tire moved through a swampland easily while an empty truck with conventional tires bogged down. In fact, the truck with the new tires pulled the other out of the mud.

Shell has patents pending on the wheel design. The company expects it to be used for work in the Canadian muskeg and in desert sands.

Designers of the wheel are J. B. Turner, automotive superintendent for Shell Oil, and W. F. Breeding, operations assistant in the company's Houston exploration department.

Ohio Oil to change its name

THE modern trend toward making corporate names conform to product brands to gain promotion and identification benefits is being adopted by Ohio Oil Co.

The Ohio board will ask shareholders at the annual meeting May 3 to vote on a change to Marathon Oil Co., effective August 1, the seventy-fifth anniversary of the company's founding. Marathon has been the major brand name under which Ohio has marketed.

Ohio's growing preference for the Marathon name has been reflected in its use for Ohio-owned companies which operate common-carrier pipelines and a finance firm. Mobil Oil Co. and Texaco Inc. are other examples of the trend.

In addition to the desire for brand identification, Ohio has been seeking a name that would reflect the increasing scope of the company's domestic and international activities, which contrast sharply with its beginnings as a Northwest Ohio producer.

Hess: big now, but thinking bigger

This East Coast independent's merger with Cletrac gives it cash and stock to use in further expansion. Already it's grown from a one-truck fuel-oil company to an integrated firm with more than $100 million in assets.

THE first public accounting of the assets of the Leon Hess enterprises reveals his family-owned oil business to be worth more than $100 million.

The Hess companies have been built from a one-truck fuel-oil distributorship to a large integrated business in 28 years. Hess has been expansion minded since he went into business, but the move which opened the publicity-shy oil man's books to the public could well mark the beginning of his greatest period of growth.

A merger with a liquidated, but flush, publicly owned farm-machinery and construction-equipment business will release him from the financial straightjacket of private ownership. He will gain the large liquid assets of the acquired firm. And by going public he will have access to further capital plus a vehicle to cash in on the fruits of his earlier efforts.

Hess has signed a merger agreement with the former Oliver Corp., known as Cletrac Corp. since the sale of its farm machinery business to White Motor Co. a year ago. Cletrac stockholders will vote on the proposal January 10 in New York City (OGJ, Dec. 18, p. 54).

Hess, Inc., Hess Trading & Transport, Inc., and Modern Solvents & Chemicals Corp. will be merged into Cletrac. The surviving corporation will be called Hess Oil & Chemical Corp., and it will seek a listing on the New York Stock Exchange.

If the deal goes through as expected, a company that is already one of the nation's large independents will emerge as a $158-million enterprise with a new springboard of capital for further growth.

Why the merger? The rapid internal expansion and outside acquisitions of Hess have been financed in part by his own cash flow.

But a large portion of his heavy investment in fixed assets—mainly the refinery at Perth Amboy, N. J.—has been financed through debt.

Cletrac, having liquidated most of its business, has much more capital than it needs to conduct remaining operations. This capital is looking for a profitable home. Thus the union of the two will solve both their problems.

Hess, long-term debt of $33 million is balanced by Cletrac's $32 million in accounts receivable left over after other assets are applied to Cletrac's $12 million in current liabilities.

Cletrac also is contributing a tax loss of more than $12 million which can be applied to Hess operating profits starting next year. Cletrac's remaining plant and equipment assets, set at $2,726,691, are expected to be disposed of soon.

Merger terms. Some 69% of the outstanding stock of the new Hess Oil & Chemical will be owned or controlled through trusts by Leon Hess, who will be president, and his father Mores Hess, who will be honorary chairman of the board. Leon Hess will be paid a salary of $100,000 per year.

J. L. Mailman, president of Cletrac, will be chairman of the executive committee.

Cletrac has 2,615,059 shares of common stock outstanding. Authorized capital stock will be increased to 20,000,000 shares, including regular common and Class A common. Hess interests will be issued 6,354,291 shares, and 400,000 will be earmarked for stock options.

The remainder — over half the authorized shares—will be available for acquisitions or for sale to raise more capital for expansion. And Hess is expected to be very active in three areas—purchase of crude-oil reserves, expansion of the large terminaling business, and construction of service stations.

Scope of operations. Hess engages in all phases of the oil business, and his vastly broadened scope has come in very recent years.

Hess produces, purchases, gathers, transports, and sells crude oil. He operates the only independent refinery on the East Coast. He purchases, transports, and markets petroleum products and petrochemicals. He stores, provides terminal facilities for others, and transports petroleum products, chemicals, edible and nonedible oils, and other liquid products. He markets mainly in New York, New Jersey, Pennsylvania, and Maryland.

He has an enviable imports position, with a crude quota of 7,134 bbl. daily and a residual-fuel quota of 37,860 bbl. daily.

Significantly, in describing his operations, Hess states first that he is engaged in the acquisition and development of prospective and proved oil and gas properties. This activity is expected to receive increasing emphasis as a chief means of boosting profits.

Producing and refining. The first big Hess move into production came in August of 1960 when he purchased, with Edward Scurlock of Houston, several wells in the Eucutta, Miss., area owned by Gulf Oil Corp.

With gross production of 2,600 bbl. daily, the wells have reserves estimated by DeGolyer & MacNaughton at 2,220,000 bbl., with 47% of the total subject to a production payment and royalties. Hess also has minority interests of about 1,000 bbl. daily in other fields.

Hess' net crude production during the past year averaged 1,400 bbl. daily.

The first stage of the Perth Amboy refinery was completed in October of 1959, with a crude distillation unit, Unifiner-Platformer, and hydrogen-treating facilities for fuel oil. The second stage, completed in July 1961, added a fluid catalytic cracking unit, vacuum unit, sulfuric

Revenues and sales of Hess companies

	1956	1957	1958	1959	1960	1st half 1961
Revenue ($ millions)	177	258	174	194	231	137
Net income ($ mil.)	1.9	5.8	1.8	3.1	5.1	3.6
Earnings/share ($)*	0.22	0.65	0.20	0.35	0.57	0.40
Product sales:						
Propane (mil. bbl.)						0.25
Gasoline (mil. bbl.)	2.8	3.4	3.3	3.4	4.1	2.8
Distillate fuel oils (mil. bbl.)	11.0	12.0	8.8	10.7	14.4	7.5
Residual fuel oils (mil. bbl.)	30.0	40.0	36.4	43.6	46.3	21.6
Total (mil. bbl.)†	43.8	55.2	48.5	57.7	64.8	32.2
Total (thou. bbl. daily)	120	151	133	158	177	178

*Based on 8,969,350 shares to be outstanding as a result of merger. †Includes export sales aggregating 15,711,000 bbl. for 1956 and 1957 when Suez Canal was closed.

alkylation unit, and a sulfur-recovery plant.

Although the crude unit has a design capacity of 55,000 bbl. daily, Hess reports operating rates up to 67,000 bbl. daily. During the past 8 months the crude unit was operated at 105% of design capacity and during November it operated at 115% of capacity.

The refinery is supplied by 2,600 bbl. daily of Hess' own production, 4,400 bbl. daily from owners of wells connected to the Hess gathering system. Two major companies supply 10,000 bbl. daily of domestic crude and 7,000 bbl. daily of foreign crude under long-term contracts. Shell Oil Co. supplies 25,000 bbl. daily under a 5-year processing agreement. The remaining 5,000 to 18,000 bbl. daily is purchased on the open market.

Marketing, transportation. Hess markets at both wholesale and retail, with heavy emphasis on residual fuel oils through his large import quota.

About 21% of the products sold are produced at the refinery, with 74% being purchased under long-term contract and the remaining 5% on the open market. Sales are made from the refinery and through 18 terminals strategically located on the Gulf Coast and in the East.

Since August of 1960 Hess has been marketing gasoline under the Hess brand name in New Jersey, selling at 2 cents under major-brand fair trade prices. Hess now has 28 branded stations, 7 more are being built, and sites for 17 others are being acquired.

Hess owns, leases, or has supply contracts to furnish gasoline to 250 retail service stations in New Jersey, Pennsylvania, Maryland, Delaware, New York, Connecticut, Rhode Island, Massachusetts, and New Hampshire.

Hess owns and operates seven U. S.-flag tankers hauling crude and products from the Gulf Coast to the Perth Amboy refinery and to the various terminals. He operates four oil barges, two dry-cargo barges, and more than 200 tank trailers and tractors.

Hess is a quiet and uncommunicative man who has carefully avoided fanfare in building his business from the days when he was a fuel-oil distributor with a single truck.

Competitors who have lost more than one contract to Hess' close bidding will tell you that he is a man to be reckoned with. With his decision to become publicly owned, and his branded retail expansion, the Hess name will be thrust increasingly before the industry.

The one thing he is certain to lose in the bargain is the obscurity which he has diligently sought in the past.

Canadian rig wages stable

. . . in most areas. Dull economic situation in drilling blamed for indifferent success of move to raise pay.

AN ATTEMPT to raise wages generally in Canada's drilling industry hasn't met with much success.

This was reported at the recent annual meeting of the Canadian Association of Oilwell Drilling Contractors in Calgary.

The economic situation was blamed for the so-so results of the move to get higher wages.

R. H. Bullied, immediate past president of CAODC, said Canadian drilling contractors "are still suffering from the same affliction as our American cousins in that there are just too many rigs for too little work."

A survey in mid-December showed that 6 out of more than 40 prominent Canadian drilling companies had granted pay raises.

The most recent increases were made by Rine Drilling Co. of Canada, Ltd., and Arrow Drilling Co., Ltd., both of Calgary.

A spokesman for Rine Drilling says his company's increase of roughly 20 cents for hourly workers took effect about mid-November. An Arrow Drilling spokesman reports raises of around 10 cents for hourly employes became effective December 1, and adds that a further increase is possible.

Wage boosts of roughly 20 cents per hour were reported earlier by Regent Drilling Co., Ltd., Edmonton, and by Parker Drilling Co. of Canada, Ltd., Brinkerhoff Drilling Co., Ltd., and Canbridge Corp., Ltd., all of Calgary.

In leading up to his report that the effort to "institute a nominal general increase has met with indifferent success," Bullied said:

"The year 1961 has not been a very encouraging one for the drilling industry and during the period the peak activity was 223 rigs, compared to 270 in the year 1960."

Bullied said that 210 rigs are now operating, "but this figure will increase during the expanded rig activity of the winter months."

Texas rig-move rates to climb sharply

Oilfield Haulers Association wins Railroad Commission approval of higher line-haul rates. New tariffs taking effect January 2 will boost short-haul charges as much as 50%. Increase falls heavy on drilling contractors.

HIGHER intrastate rates for trucking of rigs, pipe, and other oil-country equipment have been approved by the Texas Railroad Commission.

The new rates, to take effect January 2, hike line-haul rates as much as 50% for short moves of small loads, with the increases tapering off finally to zero for heavy loads moving over long distances.

Adoption of the higher rates came as an unwelcome surprise to those opposing the rate-increase application by the Oilfield Haulers Association during hearings before the commission late in October.

Opponents included the American Association of Oilwell Drilling Contractors, the Shippers Oil Field Traffic Association, individual contractors, oil operators, and manufacturers, and even some truckers.

Evidence available now indicates these groups will not accept the added trucking costs without a further fight. Specific plans have not yet been formulated. But it is expected that the oil groups will seek a rehearing before the commission. And, if the petition is refused, court action may follow.

Falls heavy on drillers. Warren Baker, executive vice president of AAODC, says the new trucking rates will mean "another jump in the cost of drilling and completing oil and gas wells in the state of Texas."

The burden of the new scales, he said, will fall heaviest on the movement of drilling rigs "because of large tonnages moving very short distances and the use of trucks and extra labor for rig dismantling and erection services."

Along with the sharp boosts in line-haul rates for short moves, the new tariff imposes higher hourly charges for supplemental services involving the use of trucks, tractors, escort cars, and extra labor.

"The new rates," Baker says "will mean over-all increases of from $400 to $1,000 on many Texas rig moves, depending on weight of rig and distance of move."

Moving a big rig (1,000,000-lb. class) between 5 and 300 miles will cost the contractor about $500 more in most cases under the new line-haul schedule.

But there is more.

If the contractor moves 200,000 lb. of drill pipe for this rig, it will cost him about $120 more then before, Baker says.

The extra trucks and tractors used in rigging up and tearing down will cost him more, too. He'll pay 50 cents an hour more for 1 to 5-ton trucks, $1.25 an hour more for 10 to 15-ton trucks, and $2.50 an hour more for trucks over 20 tons.

Rates for flagmen and extra labor will go up about 40 cents an hour, or roughly 20%. These added labor costs, Baker said, probably will average about $75 to $100 more than current charges.

All-inclusive rates denied. The OHA did not win complete approval of its application.

The commission denied the OHA request that loading and unloading charges be included in line-haul rates. It did so on grounds that the evidence introduced at the hearing did not justify such inclusion. And the commission noted in its order strong industry opposition to such all-inclusive rates on the part of many shippers.

How new Texas truck rates will affect some rig and pipe moves

	Old charge	New charge	Increase
1,000,000-LB. RIG			
5 miles	$1,400	$1,900	$500
50 miles	3,100	3,600	500
100 miles	4,700	5,400	700
200 miles	7,100	7,600	500
500,000-LB. RIG			
5 miles	700	950	250
50 miles	1,550	1,800	250
100 miles	2,350	2,700	350
200 miles	3,550	3,800	250
200,000-LB. PIPE			
5 miles	240	360	120
50 miles	520	640	120
100 miles	800	920	120
200 miles	1,260	1,300	40

Pipeline briefs

Backlog of pending construction applications before FPC rose to 202 as of November 30. They cover 7,778 miles of pipeline and 681,043 compressor horsepower with a value of $954,841,404. At the same time a year ago the totals were 6,788 miles of pipeline and 583,530 compressor horsepower with a value of $851,963,947.

Completion of the 161-mile 12-in. pipeline from its Fox Creek station near Kaybob field to Edmonton, Alta., has been announced by

One-man gas plant processes 60,000 M.c.f.d.

A COMPACT gas-processing plant has been opened by Atlantic Refining Co., at George West, Tex.

Designed and built by O. L. Olsen Co., Houston, the absorption-refrigeration plant needs only one operator per shift. At capacity it will process more than 60,000 M.c.f.d. Production is 33,000 gal. of propane, 20,000 gal. of butane, 8,000 gal. of gasoline, and 850,000 cu. ft. of ethane.

The plant is located at the focal point of a Houston Pipe Line Co. gathering system, and it returns processed gas into an HPL main. Liquid products will be marketed through distributors in the South Texas area, while ethane will go by pipeline direct to a chemical plant in the area.

Atlantic operates the plant for itself and 27 other companies and individuals.

Peace River Oil Pipe Line. The line will have a capacity of 40,000 bbl. per day. Stations will be built in 1962.

New underground-storage facilities near Columbus Junction, Iowa, are planned by Natural Gas Storage of Illinois. The company plans to drill six injection-withdrawal wells and 12 observation wells; to erect compressor and dehydration facilities; and to build a 12-mile 10-in. pipeline to Natural Gas Pipeline's mainline and 3.25 miles of 6-10 in. line. Some 2.8 billion cubic feet would be injected in 1962.

Purchase of the Gulf Refining gathering system in the Stowell, Big Hill, and Fannett fields near Beaumont, Tex., has been announced by Republic Pipe Line. The 50-mile system handles upwards of 7,500 bbl. per day for Plymouth Oil, the purchaser.

Construction of a 250-mile pipeline from the Nevada-Idaho border to Reno and other northern Nevada cities is proposed by Nevada Northern Gas, a subsidiary of Southwest Gas. Gas would be supplied by El Paso Natural Gas from its Northwest system. The line, to cost $12,500,000, would handle 50,000 M.c.f.d. and, if approved by the Nevada Public Service Commission, would be completed late in 1962.

Plans to extend service to 65 communities in 1962 have been announced by Northern Natural Gas. The program involves 365 miles of 2-in. to 16-in. branch lines and 14 miles of 26-in. mainline between Dubuque and Waterloo, Iowa. Cost will be $11,000,000. Northern will start service to 1 town in Nebraska, 3 in Iowa, 17 in Minnesota, and 44 in Wisconsin.

California field prices high, household cost low

WELLHEAD prices for California gas have more than doubled since the first gas was imported into the state in 1947.

Figures showing this increase, and showing how California producers get more for their gas than Mid-Continent producers, were presented by the Public Utilities Commission during a Los Angeles hearing last week.

However, gas spokesmen pointed out the typical household cost of gas is only $1.09 an M.c.f. in Los Angeles and only 74 cents in San Francisco. These prices compare favorably with Houston, $1.04, and Dallas, 78 cents, and are well below many big eastern consuming areas.

(Average annual prices in cents per M.c.f.)

	CALIFORNIA			TEXAS		U. S.	
	Northern Calif.	Southern Calif.	State avg.	Permian basin*	Interstate sales	Interstate sales	Wellhead avg.
1947	14.1	11.6	12.9	2.8	...	...	6.0
1948	15.4	12.4	14.2	3.5	...	...	6.5
1949	16.7	14.0	15.6	4.8	...	...	6.3
1950	15.7	14.0	15.0	5.4	...	...	6.5
1951	22.0	15.3	18.9	5.6	...	...	7.3
1952	22.2	15.5	18.6	5.6	...	...	7.8
1953	23.1	16.1	19.2	8.3	8.4	9.0	9.2
1954	23.7	17.1	19.8	9.0	9.3	9.9	10.1
1955	24.5	18.2	21.4	9.0	9.9	10.6	10.4
1956	28.6	19.7	24.1	9.0	10.6	11.3	10.8
1957	32.6	21.7	27.2	9.1	10.8	12.0	11.3
1958	29.7	22.9	26.2	9.9	11.5	13.0	11.9
1959	28.2	24.7	26.6	11.8	12.4	14.3	12.9
1960	29.8	27.8	29.0	13.8	13.6	15.6	14.0

*Sales to El Paso Natural Gas.

Opposition grows to California gas plan

State's Public Utilities Commission fails to get support for its proposal to control wellhead prices for gas. Additional hearings may be held, but no dates or specific subjects have been announced by state agency.

CALIFORNIA officials pushing a plan to control gas prices at the wellhead have not gained any serious support after two rounds of hearings, one in Los Angeles and another in San Francisco.

The only indications of support came from the cities of San Francisco and Palo Alto. All others represented at the 6 days of hearings are against state controls. The staff of the Public Utilities Commission is urging the controls as a means of stopping an upward trend in field prices.

The PUC left the door open for more hearings on gas regulation in California but didn't set any date.

The biggest buyer of the state's gas, Pacific Gas & Electric Co., opposed the controls program during the San Francisco hearings. PG&E buys from 103 producers in 80 of the state's fields and is the primary buyer of new supplies being found in the Sacramento Valley.

Frederick T. Searls, PG&E's general attorney, told the commission his company sees no need for price regulations "so long as the forces which have tended to stabilize California wellhead prices in recent years continue to operate in a reasonably satisfactory manner."

Field prices, he said, have leveled off in the last 2 or 3 years and no big jump in wellhead prices is expected.

Some producers are hoping PG&E will match the 5.47-cent wellhead price increase which will go into effect in southern California at the first of the year. Pacific Lighting Gas Supply Co. is offering a wellhead price of 34.47 cents on long-term contracts which begin next year (OGJ, Nov. 6, p. 72).

However, PG&E is in the final stages of testing a 1,400-mile 36-in. line from Alberta. The average contract volume available to the company will be 415,000 M.c.f. daily with 454,000 M.c.f. daily for peaking. Searls said the capacity of the line "can be at least doubled at attractive incremental costs by the addition of compressors."

In addition to the Canadian gas, PG&E has a firm contract with El Paso Natural Gas Co. for 1,037,000 M.c.f. daily. These out-of-state sources will supply 75% of the utility's gas in 1962.

Direct sales. Both PG&E and Pacific Lighting said that if wellhead prices are regulated, the regulation should cover sales to both utilities and non-utility firms.

Pacific Lighting says the direct sales by Richfield Oil Corp. to Southern California Edison Co., Pacific Lighting's biggest customer, have caused the increase in California gas prices.

In defending its direct sales, Richfield told the PUC the state's utilities should be forced to act as common carriers of gas. Some of the Sacramento Valley producers joined Richfield in urging a common-carrier status for the utilities' gas lines.

Pacific Lighting pointed out that Congress eliminated the common-carrier aspects of the Mineral Leasing Act in 1954. Common-carrier operations are incompatible with a gas utility's operations, the company added.

BOMBS AWAY: Thick mix of fertilizer is sprayed on brush.

RESULTS: Fire burns up to treated area, then stops.

Fertilizer used to control brush fires

TESTS conducted in California show fertilizer mixed with a thickening agent can stop brush fires.

Not only does the coating of fertilizer stop fires, but it also fulfills its prime purpose of fertilizing the land once rain washes the coating from the treated vegetation.

Shell Chemical Co. has been working with the University of California extension service and the U. S. Forest Service to perfect this new use for fertilizer. The company has used diammonium phosphate mixed with water and algin, a gelling agent from seaweed, for the tests. About 600 gal. of mix was sprayed on a 12-acre tract near Riverside recently. Fire failed to ignite the treated area 16 days later even though a light sprinkle fell between the time the area was treated and a fire test.

Shell ran similar tests last year in Madera County, California. In these earlier tests, detergent was used to thicken the mixture rather than algin. Ammonium sulfate clay also has been used effectively to control fires.

Another advantage of the new method is that it has no bad effect on the bushes or soil. Borates are used to stop fires, but it damages both the plants and soil and leads to erosion problems.

OIPA asks local enforcement in Oklahoma

CREATION of three to five conservation districts in Oklahoma, to localize oil and gas regulation enforcement, has high priority in the 1962 program of the Oklahoma Independent Petroleum Association.

The OIPA proposes that a petroleum engineer and staff of two be placed in charge of each district.

District officials would administer and enforce all general regulations except those requiring hearings before the Oklahoma Corporation Commission.

Funds for the expanded setup already have been provided, the OIPA says. The Oklahoma Legislature in 1959 increased the excise tax on oil from one-eighth cent to seven-thirty-seconds of a cent a barrel, specifying the additional money also be used for conservation purposes.

Total revenue from the excise tax in 1960, was $399,218, an increase of $171,073 resulting from the higher tax.

OIPA estimates the district program could be initiated for $60,000 to $70,000 a year, depending on the number of district offices established. It believes cost of the present conservation setup, in Oklahoma City — which handles enforcement now for the entire state—could be reduced accordingly.

"We are out to improve the conservation program in Oklahoma," says E. A. Smith, Tulsa, OIPA president.

Smith believes rules to fit localized areas would help eliminate any inequities that might exist.

Most oil operators and the bulk of royalty owners will support the idea of district enforcement, Smith says.

On 9-day pattern:

Texas' spot market will be busy

DEMAND for Texas crude is greater than the available supply.

The tight market will continue in January despite the continuation of December's 9-day producing schedule—the highest level of oil production in the state in 7 months.

A look at testimony before the December 15 allowable hearing shows that oil buyers outweigh sellers by a total of nearly 60,000 bbl. daily.

Together, Humble Oil & Refining Co., Atlantic Refining Co., Mobil Oil Co., and Sun Oil Co. will be attempting to buy roughly 97,000 bbl. daily of spot Texas oil.

On the other hand, three firms will aim at selling about 39,500 bbl. daily. They expect little difficulty. They are Gulf Oil Corp., Phillips Petroleum Co., and Cities Service Petroleum Co.

The differential between buyers and sellers would be even larger were it not for Gulf's refinery labor trouble. That company will have the bulk of the oil for sale—roughly 25,000 bbl. daily.

Allowable dips slightly. The January allowable fixed by the commission is 2,854,898 bbl. daily.

This is an increase of 9,181 bbl. daily over the allowable in effect December 2 but a decrease of 17,637 bbl. daily from the initial figure for December. The drop is due to commission adjustments for unused allowable. It will be made up and then some, however, by new wells coming into production late this month and next.

Most major crude buyers favored the 9-day schedule as adopted. Its backers included Shell, Gulf, Sinclair Oil & Gas Co., Mobil, and Texaco Inc.

Humble, Sun, and Atlantic nominated on 10 days, while Cities Service, Phillips, and Indiana Oil Purchasing Co. went the other direction to ask for 8 days.

Refinery crude runs drop slightly in November

Company—	Avg. in bbl. daily*	% of capacity
Petrofina	19,399	64.7
Atlantic Ref.	205,928	98.1
Bryson Pipe Line	485	44.0
Cities Service	265,975	90.8
Continental	163,007	84.3
Cosden	30,600	71.2
Crown Central	35,275	88.2
Danaho Ref.	2,802	23.3
El Paso Natural	23,463	95.8
Gulf	363,554	64.5
Humble	800,000	83.2
Indiana Oil	668,300	91.5
LaGloria	17,097	71.2
Monarch	2,235	55.8
Ohio	97,987	84.8
Permian	1,889	33.3
Phillips	221,200	80.6
Plymouth	41,761	92.8
Premier	12,443	55.0
Pure	155,655	83.2
Rado Refining	1,235	82.3
Shamrock	25,047	92.9
Shell	557,587	93.9
Signal	58,975	98.2
Sinclair	435,424	89.0
Skelly	50,138	92.0
Socony Mobil	597,000	83.3
Sohio	121,309	71.1
Standard (Tex.)	50,224	67.0
Sun	209,192	82.0
Suntide	46,171	71.0
Texaco	700,900	94.8
Tidewater	219,467	79.8
Others	2,390	64.3
Nov. total	**6,204,114**	
Oct. total	**6,215,476**	

*As reported to Texas Railroad Commission.

Industry briefs

A new operator, W. E. Stiles Engineering, Tulsa, has been appointed for the Born Booch Sand unit water flood and 16 other producing properties in Seminole and Hughes counties, Oklahoma. The properties are owned by Winona Oil, Sunray Mid-Continent, Cities Service Petroleum, and others. Winona formerly was operator.

Shasta Oil, Abilene, Tex., has been identified as new buyer of Sharon Ridge area sour crude gathered by Southwestern Hydrocarbon Pipe Line, Corsicana, Tex. This reportedly is a move to hold a crude supply threatened by the possible entry of two new pipeline buyers (OGJ, Dec. 18, p. 44). Cosden Petroleum, Big Spring, Tex., will process the oil for Shasta, an oil brokerage and trucking company.

A company name change has been announced by Fordee-Rhoades Oil of Tulsa. Effective January 1, the company will become Rhoades Oil Co.

Approval to merge Columbian Carbon into Cities Service was given by stockholders of the two firms last week. Columbian, a leading producer of carbon black, printers ink, paints as well as oil and gas, will be absorbed in an exchange of stock worth more than $100 million. "Pooling of interests" is expected to be accomplished by next January.

Vickers Petroleum, Wichita, Kans., has sold major portions of undeveloped oil and gas properties to Alco Oil & Gas, Chicago. Deal involved transfer of undisclosed amount of Alco stock to Vickers, along with warrants to buy additional shares. Alco acquired leases on about 22,000 acres in Oklahoma, Kansas, Texas, New Mexico, and Rockies as part of transaction. Earlier, Vickers sold its working interests in some other properties to National Cooperative Refinery Association, McPherson, Kans. (OGJ, Dec. 18, p. 47).

Merger of Union Texas Natural Gas into Allied Chemical, proposed last month by officers of the companies, was approved last week by their respective boards of directors. Stockholders now must pass on the $350 million exchange of stock.

Moonie 1 brightens Australia's hopes

Union's Queensland wildcat tests 1,765 bbl. of high-gravity crude. With gas to the north, the strike suggests the possibility of a major producing trend along an old shoreline. Next: more seismic work and another test.

AUSTRALIA at long last has a commercial oil well. Union Oil Co. of California officially classified its Moonie 1 a "commercial discovery" after the well tested 1,765 bbl. daily of 47°-gravity crude with 175,000 cu. ft. of gas on a 58-minute test.

Location of the Moonie discovery is significant. It's on one of a string of anticlines along what may prove to be an old shoreline. And it lines up beautifully with earlier gas discoveries near Roma and with Permian outcrops to both the north and south.

It's giving some Australians dreams of a long producing trend paralleling the coastline and 200 or more miles inland (see map).

The Moonie well is in the Great Artesian basin of Queensland. It tested a total of 27 ft. of oil sands from two zones, with perforations between 5,808 ft. and 5,818-39 ft. Production is from the Bundamba-Triassic sandstone.

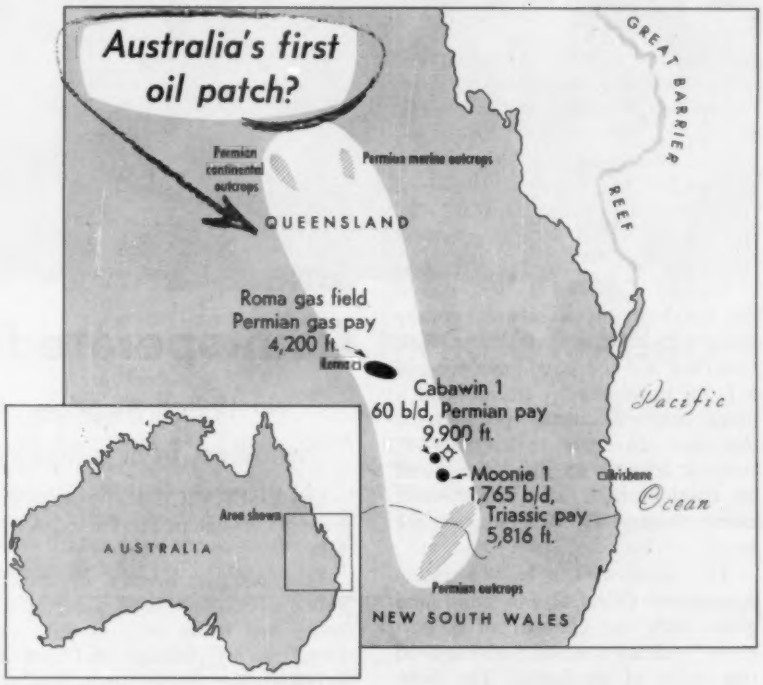
The first electric logs on the Moonie indicated two pay zones in the Bundamba above the perforated intervals. However, another set of logs indicates these zones may be wet. At present, only one looks good enough for a test.

Initial flowing pressure of the well was 2,513 psi., and final pressure was 2,157 psi. Shut-in pressure is 2,456 psi.

The well initially flowed 250 bbl. of oil and an equal amount of water on a drill-stem test between 5,815-5,925 ft. (OGJ, Dec. 11, p. 63).

The well was plugged back 86 ft. for the later and more successful test. Total depth of the hole is 6,106 ft.

Union Oil's partners in the test are Kern County Land Co. and Australian Oil & Gas Corp. The group holds exploration rights to 40 million acres in Queensland and New South Wales. Union is operator.



Union's plans. Union says it probably will be the middle of January before it can follow up the Moonie discovery with a confirmation test.

More seismic work probably will be done before another location is staked. Additional shooting is needed to better define the structure. Some sides are open, which could change the size of the structure as much as 50%.

Heavy rains are delaying any immediate rig move. High water has forced the crew to travel about 2 miles by boat during part of the last 6 weeks. And once the rains stop and and the rig is skidded, it will take at least a week to erect the standard derrick used by the contractor, Oil Drilling & Exploration Co., an Australian driller.

Permian shoreline. The geological thinking that led to the country's first commercial find—after an investment of $142 million and 500 wells—was the theory that an old Permian shoreline may lie roughly parallel to the present coast 200 to 300 miles inland.

Evidences of this are outcrops of marine and continental sediments of Permian age several hundred miles to the northwest on the rim of the adjoining Bowen basin, and Permian outcrops to the southeast on the edge of the Great Artesian basin.

The Moonie discovery is on one of a string of anticlines along this possible shoreline. While production is from Triassic, some geolo-

gists speculate that the oil may have been formed in Permian, and trapped in the later formation. Most stratigraphic charts show the Bundamba as Lower Jurassic in age, but Union (for the moment, at least) prefers a Triassic label.

Possibilities of production from this supposed shoreline brightened with the discovery of wet gas in the Roma area last year. Much of the gas is from Permian found at about 4,200 ft. The best well, Pickanjinnie 1, tested 6,700 M.c.f. daily through a 1-in. choke from two zones with 28-ft. net pay below 4,000 ft.

Union Oil's 60-bbl.-daily Cabawin 1 discovery, southeast of Roma, hit an 8-ft. Permian pay at 9,928 ft. (OGJ, Nov. 6, p. 91). Union moved its rig 4 miles east for its second try, but the well crossed a fault and was abandoned at 12,091 ft. The pay sands were deeper and had shaled out.

Union's Cabawin 1 was staked on the basis of a seismic survey using a 5-mile pattern. When East Cabawin was found to have crossed a fault, the company decided on a more detailed seismic program in the area. In order to keep its rig busy, it moved 18 miles southeast to another high at Moonie, and made Australia's long-sought big hit.

The latest wildcat by Australian Associated Oilfields fits hand and glove with the concept of a Permian source that deepens toward the center of the basin. The company's Glentulloch 1, located 60 miles northwest of Roma, this month tested 7,150 M.c.f. daily of gas from a shallow Permian pay between 2,727-2,809 ft. on the third drill-stem test.

The well is being deepened and the company said it expects the gas flow to double by the time the hole reaches basement. Plans are being made for stepout drilling to evaluate the structure.

Moonie lies within 40 miles, more or less, of rail connections. This may make tank-truck and rail shipments of crude to the coast feasible, even if reserves do not warrant investment in a 200-mile pipeline to the port of Brisbane.

Any commercial crude will have a ready market, and an established refining industry which can absorb it.

Coin-operated pumps catch on

. . . in United Kingdom. Motor scooter operators serve themselves from pumps dispensing gasoline-fuel-oil mix.

SELF-SERVICE fuel pumps are getting a tryout in the United Kingdom.

The pumps, already in use in Sweden, Belgium, and the Netherlands, are being used to dispense a mixture of gasoline and fuel oil to two-stroke engines used in motor scooters.

An Esso dealer near Southampton installed the first of the pumps on his own initiative. But Esso plans to install a half dozen more in stations near London. Total, a CFP subsidiary,' is installing one of the pumps in a big combination parking lot and service station being built in London. Other companies are studying the situation closely.

A coin-operated pump is attractive for supplying motor scooters because of the small volume of each sale. But its usefulness for selling straight gasoline may be limited. The biggest British coin is worth about 35 U. S. cents, and a gallon of premium in the UK costs about 70 cents. Drivers filling their cars would therefore need pockets full of coins to use self-service pumps.

Local governmental authorities also are skeptical about coin-operated pumps, especially about the safety of unattended sales to tipsy drivers after closing hours.

Foreign briefs

Production potential of Aramco's Safaniya offshore oil field has been increased from 270,000 to 315,000 bbl. daily with the opening of a 24-in. loop to the offshore trunkline. The new loop extends from platforms 1 to 7, about 12 miles out in the Persian Gulf. An extension to the loop also has been laid to platform 8. It will handle 15,000 bbl. daily from two new Safaniya wells, Nos. 31 and 32.

An 18,000-ton oil tanker has been launched in Japan by Gulf Oil. It is the fifth of six tankers to be built for Gulf's Belgian subsidiary, Belgulf Tankers, SA. The vessel, built at Kawasaki shipyard, will move refined products to Gulf's European marketing areas. Home port for the 561-ft. tanker, which

ENI considers laying 190-mile gas line from Lucania region to Rome

ROME may get natural-gas supplies from a young field in southern Italy.

ENI has under study a proposed 190-mile 44,000-M.c.f.-daily-capacity pipeline to the Italian capital from Ferrandina field in the Lucania region. A branch may be built to Terni and Narni.

Construction already has started on a new petrochemical center at Lucania to be supplied by gas discovered in the area by ENI (OGJ, Sept. 18, p. 64).

The Ferrandina discovery is one of several made by ENI in its efforts to expand Italy's gas industry outside the Po Valley of northern Italy. A fourth well is being drilled in one of these finds, a new offshore gas field about 30 miles off Ravenna in the northern part of the Adriatic Sea. The last well was completed with a potential of 2,800 M.c.f. daily.

A new gas field also is being developed in the Enna area of Central Sicily, where the first three wells indicate reserves of at least 350 billion cubic feet. ENI has three rigs working on the structure.

First frigid-LPG tanker loaded

OIL-INDUSTRY history was made recently at Ras Tanura, Saudi Arabia, when the first shipment of refrigerated LPG from Aramco's new Persian Gulf terminal was loaded aboard a specially designed tanker, the Gohshu Maru.

Opening the valve of an aluminum loading arm (above) sent 50,000 bbl. of refrigerated propane and butane into insulated tanks installed over the keel of the ship. The LPG was delivered to Japan (OGJ, Dec. 11, p. 62).

carries a crew of 44, will be Antwerp.

A license for construction of a carbon-black plant near Bombay has been granted to United Carbon, Houston, and the Central Bank of India. United Carbon says the plant will have an initial rated capacity of at least 30 million pounds yearly and will cost about $5 million. Indian nationals will hold controlling interests in a new company to be formed by United Carbon and the Indian bank.

Crude from Macquia oil field in eastern Peru is moving to refineries at Iquitos, Peru, and Manaos, Brazil, on four new barges pushed by two tugs. The equipment was brought in from Houston via the Amazon River and its tributaries. Macquia, owned by Cia. Peruana de Petroleo "El Oriente," a Peruvian company with three German partners, produces about 750 bbl. daily from 10 wells.

Russia expects to complete a 370-mile gas-pipeline extension from Gorki to Cherepovets, via Yaroslavl, in December. The line is an addition to a new system which moves gas north from Saratov fields to Gorki in East-Central Russia.

Kellogg companies are handling the design and serving as construction advisors on a 40,000-bbl. refinery and petrochemical complex being built by Caltex 18 miles west of Frankfurt, Germany. Petrochemical units will include a 70,000-tons-per-year ethylene plant, a 13-million-cubic-foot-daily hydrogen plant, and a pyrolysis naphtha hydrotreating plant. They are scheduled for completion in the fall of 1963.

Deepest wildcat in eastern Siberia has been taken to 13,050 ft. in the Oloisk area of Yakutsk Autonomous Republic. Several wildcats have been drilled below 11,500 ft. near the confluence of the Vilyuy and Lena rivers, where gas reserves estimated at more than 880 billion cubic feet have been found.

A carbon black plant will be built at Haifa by Israel Petrochemical Enterprises. A United Carbon Co. design will be used. The plant will be completed in the second half of 1963 and will have a capacity of 20 million pounds per year.

Creole Foundation has made unrestricted grants ranging from $500 to $5,000 to 34 colleges in the U. S. where Venezuelan students have foundation scholarships.

Wildcatting surge expected in Spanish Sahara

Two tests are under way, and four more operators plan wildcats in early '62.

ANOTHER wildcat has been spudded in the Spanish Sahara, and four more are expected to be kicked off during the next 3 months.

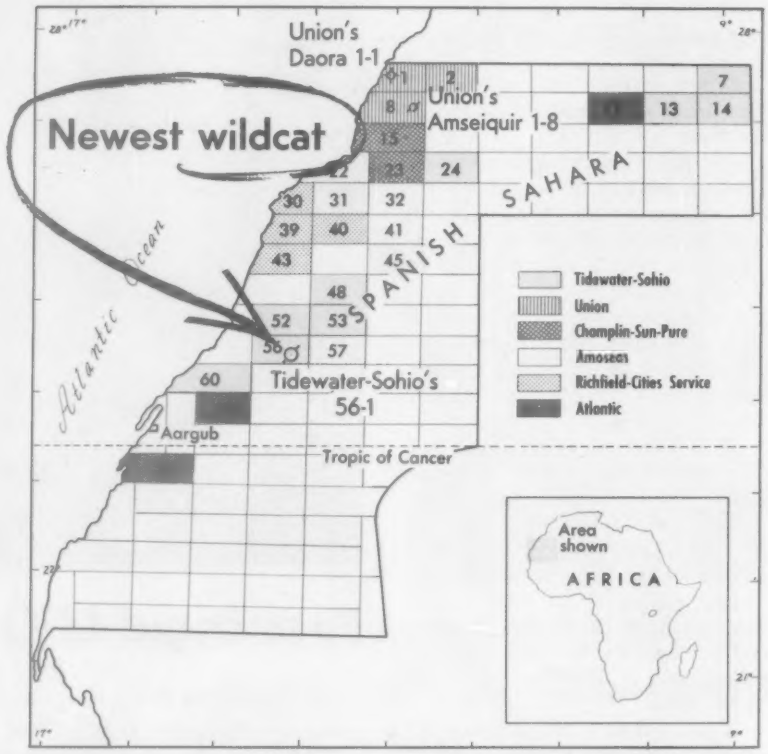
Tidewater Oil Co. spudded the 56-1 in Block 56 as the first test on about 6 million acres held in the Spanish Sahara jointly with Standard Oil Co. (Ohio) and Banco Urquijo, a Spanish company headquartered in Madrid.

At least four other operators are expected to spud their first wildcats in the Spanish Sahara before the first of April. They include Richfield Oil Corp., which holds acreage with Cities Service Oil Co.; Champlin Oil & Refining Co., operator on acreage held with Sun Oil Co. and Pure Oil Co.; Atlantic Refining Co.; and American Overseas Oil Co., Ltd.

These four new operators will bring the total active wildcats in the Spanish Sahara to six.

Union Oil Co. is drilling its second wildcat in Block 8. The test, Amseiquir 1-8, was drilling ahead below 6,326 ft. last week. Union's first test, the Daora 1-1, was dry at 13,914 ft.

The 56-1 will be the third test in this rank wildcat territory. The only other active drilling done since the concessions were granted 2 years ago has been Union's wells and some stratigraphic tests drilled by Gulf Oil Corp. and Atlantic Refining Co.



The Tidewater-Sohio wildcat is scheduled to go to a total depth of between 8,000 and 10,000 ft. It is being drilled on one of the structures outlined by more than a year's seismic work. And it will determine whether additional wells will be drilled on this or some other structure.

The 56-1 and the two Union wells are in the L'Asiun basin which runs along the coastal area of the country. No drilling has been done in the Tindouf basin in the interior of the country.

A French-Spanish drilling contractor, Sonpetrol, is doing the drilling for Tidewater and Sohio. The company landed an Emsco 800 at Aargub late last month.

Italy's Gela field going into full production soon

WESTERN Europe's biggest oil field soon will go into full production because of coking facilities that will make refinable crude out of the heavy, 7°-10°-gravity oil.

The facilities will convert thick, asphaltic oil from Gela field, Sicily, into a synthetic crude which will supply a 60,000-bbl.-daily refinery and petrochemical complex which now are being constructed near the field.

Output of the coker will be handled conventionally to produce a full range of products. An aromatics fraction, gas fractions, and hydrogen sulfide will be used as feed stocks for the petrochemical units. Gas fractions will be taken directly from the coking operation as well as from downstream units. LPG will be among the end products.

The plant, being built by ENI, will enable the state agency to fully open a field that has been on limited production since its discovery 5 years ago. ENI has completed 45 wells in the Middle Triassic dolomite pay found between 10,000-11,500 ft., and five more are drilling. Some of the wells are completed as flowing wells and others as pumpers. Current output is 5,000 bbl. daily. A 2,500-bbl. topping plant is in operation at the field.

Gela and Gulf Oil's nearby 24,300-bbl.-daily Ragusa field will make Sicily one of Europe's most important crude-producing centers. They will make Italy second only to West Germany, where more than 100 small fields produce 125,000 bbl. daily.

A SPECIAL SECTION
PREPARED BY THE
OIL AND GAS JOURNAL

WORLD-WIDE OIL

COUNTRY-BY-COUNTRY HIGHLIGHTS . .

The year now closing was exciting for oil. A new continent made its bid to be counted as an oil province as Australia finally got a commercial well. Drillers for the first time made hole in the arctic regions. Russian oil exports hit a half million barrels. New oil was found in Libya and in the Persian Gulf. And natural gas was beginning to create a stir abroad. Engineers even explored the possibility of transporting natural gas from gas-rich North Africa to gas-hungry western Europe via a Mediterranean pipeline. This year-end issue of the Journal reviews these and other oil-important events in country-by-country summaries. These discussions by the Journal's international editors are supplemented by . . .

PRODUCTION-REFINING DATA . . .

These data are conveniently tabulated, and include field names and their discovery dates, depth, number of flowing and pumping wells, daily average and cumulative production, and the gravity of the oil. Refining data include company and refinery location, crude capacity, and a processing breakdown. In addition to these data, there are . . .

MAPS . . .

These are of the Persian Gulf area, North Africa, and Argentina. They show oil and gas fields, refineries, oil pipelines, and projected pipelines.

World-wide oil

at a glance

COUNTRY	Page No.	RESERVES Proved 1,000 bbl.	WELLS Producing 7-1-61	WELLS Drilling 12-1-61	PRODUCTION Daily 1961 1,000 bbl.	PRODUCTION % Change from 1960	REFINING No. oper. refs.	REFINING Capacity 1,000 BPSD as of Jan. 1, 1962 Crude	Cracking	Reforming
Bahrain	106	245,000	149	..	45.1	....	1	186.5	43.3	30.4
Iran	106	35,000,000	109	12	1,190.0	+22.7	3	530.0	30.0	82.5
Iraq	108	26,500,000	96	7	1,000.0	+ 3.5	6	76.3	21.0	5.0
Israel	108	34,000	26	4	2.8	+12.0	1	57.2	14.2	....
Jordan	112	.....	...	..	.....	.....	1	6.4	....	....
Kuwait	109	62,000,000	374	3	1,650	+ 1.6	2	230.0	....	4.0
Lebanon	112	.....	...	..	.....	.....	2	24.1	....	1.4
Neutral Zone	110	6,000,000	196	5	178.0	+30.9	1	50.0	....	....
Qatar	111	2,750,000	33	1	176.0	+ 1.7	1	0.6	....	....
Saudi Arabia	111	52,000,000	216	3	1,377.0	+10.4	1	189.0	....	42.1
Southern Arabia*	112	3,500,000	....	3	.....	.....	1	137.0	....	12.0
Syria	112	100,000	....	..	.....	.....	1	20.0	....	....
Turkey	113	75,000	68	11	7.6	+ 5.5	1	7.0	3.0	....
Total Middle East		188,204,000	1,267	49	5,626.5	+ 8.8	22	1,514.1	111.8	177.4
*Includes offshore.										
Algeria	113	5,500,000	292	31	323.0	+ 78.4	...	....	....	....
Angola	118	30,000	15	3	1.4	+ 7.7	1	4.0	....	....
Egypt	115	710,000	279	18	74.1	+ 16.7	3	93.2	2.7	6.9
Gabon	118	150,000	66	3	15.0	— 3.8	..	....	....	....
Kenya	115	.....	...	..	.....	.....	..	....	....	....
Libya	116	3,000,000	149	34	19.0	.....	..	....	....	....
Morocco	117	9,500	174	1	1.9	.....	1	2.1	1.8	....
Moyen Congo	118	10,000	7	..	2.0	+400.0	..	....	....	....
Mozambique	115	.....	...	..	.....	.....	1	12.0	....	2.5
Nigeria	118	300,000	39	3	43.5	+141.7	..	....	....	....
Senegal	118	.....	...	..	.....	.....	..	....	....	....
South Africa	119	.....	...	..	.....	.....	1	29.0	15.0	5.0
Somalia	115	.....	....	2	.....	.....	..	....	....	....
Spanish Sahara	119	.....	....	2	.....	.....	..	....	....	....
Tunisia	119	.....	....	1	.....	.....	..	....	....	....
Total Africa		9,709,500	1,021	98	479.9	+ 70.3	7	140.3	19.5	14.4
Argentina	121	2,400,000	5,401	109	252.0	+44.0	15	348.5	134.8	3.3
Barbados	126	.....	....	..	.....	.....	1	1.2	....	....
Bolivia	122	125,000	128	14	8.7	— 3.3	3	11.2	....	....
Brazil	123	325,000	717	69	96.0	+19.6	9	298.8	88.8	33.8
Chile	123	150,000	139	6	25.2	+29.2	1	44.0	23.5	10.5
Colombia	124	750,000	2,154	17	146.0	— 4.0	5	80.8	48.9	....
Cuba	125	1,000	....	..	0.2	.....	6	86.9	24.5	10.9
Ecuador	127	30,000	1,683	7	8.3	+10.7	3	16.2	6.0	....
Guatemala	126	.....	....	1	.....	.....	..	....	....	....
Mexico	127	2,500,000	2,509	147	283.0	+ 7.2	6	375.0	112.0	....
Netherlands West Indies	126	.....	....	..	.....	.....	2	680.0	476.0	20.0

COUNTRY	Page No.	RESERVES Proved 1,000 bbl.	WELLS Producing 7-1-61	WELLS Drilling 12-1-61	PRODUCTION Daily 1961 1,000 bbl.	PRODUCTION % Change from 1960	REFINING No. oper. refs.	REFINING Capacity 1,000 BPSD as of Jan. 1, 1962 Crude	Cracking	Reforming
Panama	126	.....	....	1	.....	.....	..	....	....	....
Peru	129	400,000	2,102	12	52.1	+ 7.2	3	48.6	20.8	....
Puerto Rico	127	.....	....	..	.....	.....	2	102.0	58.0	7.5
Trinidad	130	475,000	3,217	23	124.6	+11.2	3	301.0	53.0	24.0
Uruguay	131	.....	....	..	.....	.....	1	48.0	7.0	3.0
Venezuela	131	17,550,000	9,866	32	2,906.0	+ 2.1	15	985.0	160.0	39.4
United States		35,500,000	600,000	3,034	7,181.0	+ 2.1	296	10,573.4	7,062.7	2,142.8
Canada		5,000,000	17,421	160	616.0	+17.6	45	1,015.7	549.8	174.4
Total W. Hemisphere		**65,206,000**	**645,337**	**3,632**	**11,699.1**	**+ 3.9**	**416**	**15,016.3**	**8,826.4**	**2,469.6**
Australia	134	2,000	....	5	.....	.....	6	256.0	82.5	41.2
British Borneo	135	715,000	510	2	83.0	—12.2	1	46.0	....	....
Burma	135	45,000	451	4	11.2	.....	2	11.1	1.7	....
Formosa	135	500	....	..	.....	.....	1	39.0	14.0	2.8
India	136	500,000	118	17	8.6	.....	4	118.7	28.1	10.5
Indonesia	137	9,500,000	2,421	12	432.0	+ 6.2	5	269.8	55.0	15.0
Japan	139	60,000	1,940	15	12.7	+25.8	27	1,096.4	54.0	78.8
New Guinea (incl. Papua)	140	20,000	43	..	2.7	—35.7	..	....	....	....
New Zealand	...	.....	....	2	.....	.....	..	....	....	....
Pakistan	141	25,000	96	4	7.6	+28.8	1	6.0	....	....
Philippines	141	100	....	1	.....	.....	2	50.0	23.0	3.8
Singapore	141	.....	....	..	.....	.....	1	20.0	....	....
Timor	...	.....	....	1	.....	.....	..	....	....	....
Total Asia-Pacific		**10,867,600**	**5,579**	**63**	**557.8**	**+ 3.0**	**50**	**1,913.0**	**258.3**	**152.1**
Austria	142	260,000	987	9	45.4	— 1.5	7	85.6	11.0	8.6
Belgium	143	.....	....	..	.....	.....	6	187.0	28.5	31.6
Denmark	149	.....	....	..	.....	.....	1	20.0	....	4.0
Finland	149	.....	....	..	.....	.....	1	28.0	13.5	3.4
France	144	225,000	545	31	42.0	+ 7.7	14	914.7	117.9	158.4
Greece	145	.....	....	1	.....	.....	1	30.0	....	8.2
Ireland	151	.....	....	..	.....	.....	1	42.0	....	9.0
Italy	145	320,000	96	31	37.7	+ 1.3	34	851.1	70.8	148.3
Netherlands	146	250,000	418	4	38.3	+ 6.4	3	463.0	113.5	46.2
Norway	149	.....	....	..	.....	.....	2	44.4	....	6.0
Portugal	147	.....	....	..	.....	.....	1	29.0	11.0	....
Spain	147	.....	....	7	.....	.....	2	192.5	3.5	42.5
Sweden	149	.....	....	..	.....	.....	4	64.9	....	21.1
United Kingdom	149	6,000	261	2	2.0	+11.1	15	1,064.6	146.8	143.8
West Germany	151	500,000	3,877	88	121.0	+13.1	27	876.7	122.8	149.3
Yugoslavia	154	175,000	....	20	26.3	+44.5	3	24.6	4.6	....
Total Europe		**1,736,000**	**6,184**	**193**	**312.7**	**+ 9.5**	**122**	**4,918.1**	**643.9**	**780.4**
Total Free World		**275,723,100**	**659,388**	**4,035**	**18,676.0**	**+ 6.4**	**617**	**23,501.8**	**9,859.9**	**3,593.9**
Russia and controlled areas	148	***34,252,000**	....	..	**3,650.0**	**+10.8**	..	.....	.....	.....

*Includes in 1,000 bbl.: USSR 32,500,000; Rumania 1,000,000; Hungary 100,000; Albania 15,000; China 500,000; Czechoslovakia 12,000; and Poland 25,000.

WORLD-WIDE OIL

COUNTRY-BY-COUNTRY REPORT
by Paul Swain and Ray Gibson

Abbreviations used in the tabulations with this report

Cracking Processes:

FCC—Fluid cat cracking
TCC—Thermofor cat cracking
HD—Houdriflow cat cracking
Vis—Visbreaking
Plf—Polyforming

Other Processing:

A—Asphalt
Alky—Alkylation
BHP—BP Hydrofining
Cat—Atlantic Catforming
CH—Catalytic hydrodesulfurization
CR—Cat reforming
Fhy—Fluid Hydroforming
H—Hydrogenation
HF—Houdriforming
Hyd—Esso Hydrofining
is—Butane isomerization
L—Lube manufacture
PD—Perco desulfurization
Pf—UOP Platforming
Poly—Polymerization
Pwr—Esso Powerforming
Rex—Rexforming
Sf—Socony
C—Coke
T—Thermal reforming
TR—Shell Trickle
SB—Sinclair-Baker
Un—UOP Unifining
V—Vacuum distillation

MIDDLE EAST

BAHRAIN

HOPES for any future increase in crude production on Bahrain dimmed this year when Bahrain Petroleum Co. abandoned its first offshore well on a shoal off the north end of the Persian Gulf island. With little room to explore, the Caltex affiliate may have to be content with the stabilized 45,000 bbl. daily in the shaikhdom from now on. The big refinery, drawing most of its feed by pipeline from Saudi Arabia, continues to be one of the most important sources of products in the Middle East.

BAHRAIN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bahrain Zone, 1932	2,200	145	....	.....	.....	33.0
Fourth Pay, 1936	4,500	4	....	45,049	254,561,909	36.0
Total		149	....	45,049	254,561,909	

BAHRAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Bahrain Petroleum Co., Ltd., Bahrain	*186,500	16,020	27,300 FCC	19,950 T 10,450 Pf	34,020 V, 10,450 Un, 2,050 Poly, 1,990 A
Total	186,500	16,020	27,300	30,400	

*All figures on calendar-day basis.

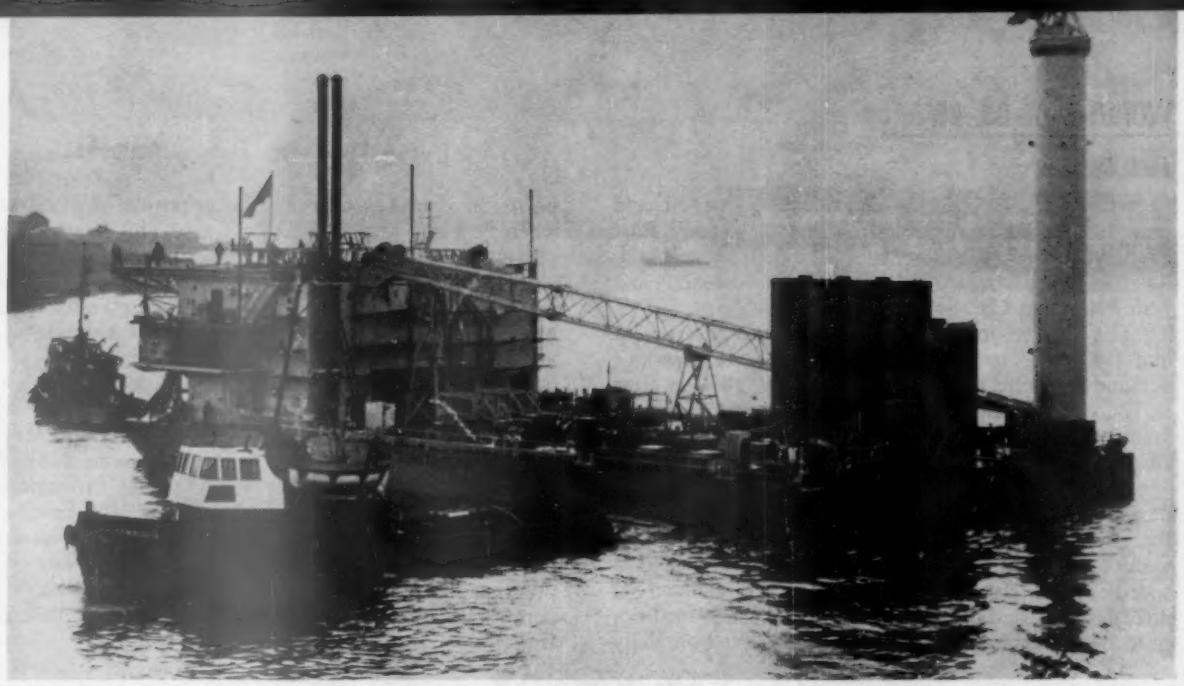
IRAN

ANOTHER big Iranian oil field appeared to be in hand this year when Iranian Exploration & Producing Co., one of the operating companies for the consortium group, brought in 8 Ahwaz as a 26,000-bbl.-daily producer.

The big well climaxed 46 years of probing the structure, and was a postscript to a spectacular 6 Ahwaz blowout and 65-day fire in 1958. No. 6 is producing from 6,000 to 7,000 bbl. daily with output held in check to control the sand, and late this year the No. 11 development well was drilling.

The Ahwaz success adds further to Iran's already vast reserves, which without straining now support rising production that hit nearly 1.3 million barrels daily in a peak month. Further reserves are in the making in the consortium area at Bibi Hakimeh, where the first wildcat test came in as a 3,500-bbl. well after treatment. Wildcats are in progress at Qeshm and Kharg Islands, which are included in the agreement area.

The government's National Iranian Oil Co. is wrestling with two major fields southwest Tehran. A gas pipeline is in the planning stage from one of them,



A MASSIVE MOBILE WORK PLATFORM, equipped with a 100-ton crane instead of a drilling platform, will help a British-French company put a marine oil field in the lower Persian Gulf by mid-1962. Abu Dhabi Marine Areas, Ltd., owned by British Petroleum and Cie. Francaise des Petroles, is the company which will use the equipment.

Sarajeh, a gas-distillate field with reserves estimated at over 7 trillion cubic feet. The tenth well is getting under way at Alborz oil field, a few miles away, where test flows in the 20,000-bbl. range have been reported.

The government's most tangible success, however, is being achieved in supplying the domestic market with products. Its Trans-Iranian pipeline now moves 44,000 bbl. daily of products to terminals in Central and northern Iran. An expansion program winding up this year increased the over-all length of the system to 1,340 miles. Production at the NIOC-operated Naft-i-Shah field also increased to better than 7,500 bbl. daily. This is the basis of an integrated producing, pipelining, refining, and marketing operation in West Iran.

ENI continues to drill in the vicinity of its reported 3,500-bbl.-daily discovery at the head of the Persian Gulf. The Italian state-agency, which will receive 25% in a 75-25 profit split, has not started commercial production.

Pan American (Indiana Standard) also hit pay dirt when its Darius 1 offshore wildcat 3 miles south of Kharg Island came in as a 15,000 to 25,000-bbl.-daily, or better, discovery late in the year. Commercial production tentatively is expected to start by the fourth quarter of 1962. The Iranian Government has half interest in the operation.

IRAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping†	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Agha Jari, 1937	6,500	32	....	707,156	1,630,000,000	35.4
Ahwaz, 1958	9,000	1	....	6,540	3,400,000	31.5
Alborz (Qum), 1956	8,500	....	....	(1)	....	..
Gachsaran, 1928	7,000	13	....	243,610	280,600,000	31.8
Haft Kel, 1928	3,500	18	....	115,980	1,281,200,000	37.7
Lali, 1938	5,800-8,000	4	....	5,300	43,400,000	35.6
Masjid-i-Sulaiman, 1908	2,500	4	19	33,782	962,400,000	37.9
Naft-i-Shah, 1935	2,100-3,000	4	....	7,534	40,513,511	..
Naft-Safid, 1935	5,600	14	....	33,346	124,100,000	35.4
Pazanun, 1936	6,500	....	....	.....	6,500,000	36.4
Sarajeh, 1958	8,000-8,590	(2)	....	.....	....	..
Total		90	19	1,153,248	4,372,113,511	

(1) 2-well Iran Oil Co. field not on production. (2) 6-well gas-condensate field being developed by Iran Oil Co. *Another 349 wells variously classified as shut in, observation, or suspended. †Includes gas lift.

IRAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Iraanse Aardolie Raffinage Maatschappij N.V. (Iranian Oil Refining Co.):					
Abadan	[1]450,000	.....	30,000 FCC	82,500 T	69,000 V, 8,000 Alky, 400 L, 5,000 A
Masij-i-Sulaiman	75,000	.....	.....	.....	.....
National Iranian Oil Co., Kermanshah	5,000	.....	.....	.....	.....
Total	530,000	.....	30,000	82,500	

(1) 20,000-bbl. Platformer under construction.

IRAQ

THE THREAT of another Middle East oil and political calamity hung over Iraq and the Middle East as the year drew to a close, following a complete break in negotiations between Iraq's Premier Kassim and Iraq Petroleum Co.

The three major points over which the government and IPC came to a complete impasse were Kassim's demand for more than half the profits, a 20% interest in IPC, and a dispute over the method of relinquishment of a large part of the three IPC companies' concession areas.

IPC's stand was that after 3 years of talks, Iraq's demands increased, rather than diminished. It said the government agreed verbally to one concession reduction program a year ago, and later demanded a speedier relinquishment. Most of all, IPC claimed its affiliates invested $280 million to expand facilities needed to double production to 1,400,000 bbl. daily on the basis of Kassim's promise to protect their rights when he came to power 3 years ago. This year's output averaged about 970,000 bbl. daily.

The results may be that Iraq will seek to develop areas it is almost certain to force IPC to give up. The government already operates a refinery at Baghdad, and a small oil field in eastern Iraq.

Exploration has been at a standstill for the greater part of the year outside proven areas at the order of the government. Work on a 530-mile 30, 32-in. loop from Kirkuk field to Tripoli, Lebanon, was in its final stages, however, as part of IPC's earlier investment program. Work also is progressing on a deepwater terminal being built 24 miles offshore from Fao in the Persian Gulf. This, in connection with a looping program from Rumaila and Zubair oil fields, will permit major expansion of crude production in southern Iraq.

IRAQ PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Ain Zalah, 1939	5,800	6	....	19,320	60,149,773	30.5
Bai Hassan, 1953	4,800	7	....	45,570	16,945,260	34.0
Butmah, 1952	5,100	3	....	6,526	14,965,905	30.5
Jambur, 1954	5,700	2	....	15,967	10,588,620	34.0
Kirkuk, 1927	2,800	45	....	688,840	2,061,782,241	35.9
Naft Khaneh, 1923	3,000	2	....	*3,500	*62,500,000	42.0
Rumalia, 1953	10,800	3	....	112,665	275,366,355	35.0
Zubair, 1949	11,000	28	....	78,307	281,167,237	35.0
Total		96	....	970,695	2,783,465,391	

*Estimated.

IRAQ REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Government Oil Refineries Administration:					
Daura	48,000	17,000 Vis 4,000	.....	5,000 Pwr	12,250 V, 5,000 Un, 400 L, 1,000 A
Qaiyarah	(1)2,280	.....	.....	.....	.....
Khanaqin, Alwand	12,500	.....	.....	.....	.....
Muftieh Depot, Basrah	4,230	.....	.....	.....	.....
Iraq Petroleum Co., Ltd.:					
K. 3 (Haditha)	6,450	.....	.....	.....	.....
Kirkuk	2,880	.....	.....	.....	.....
Total	76,340	21,000	.....	5,000	

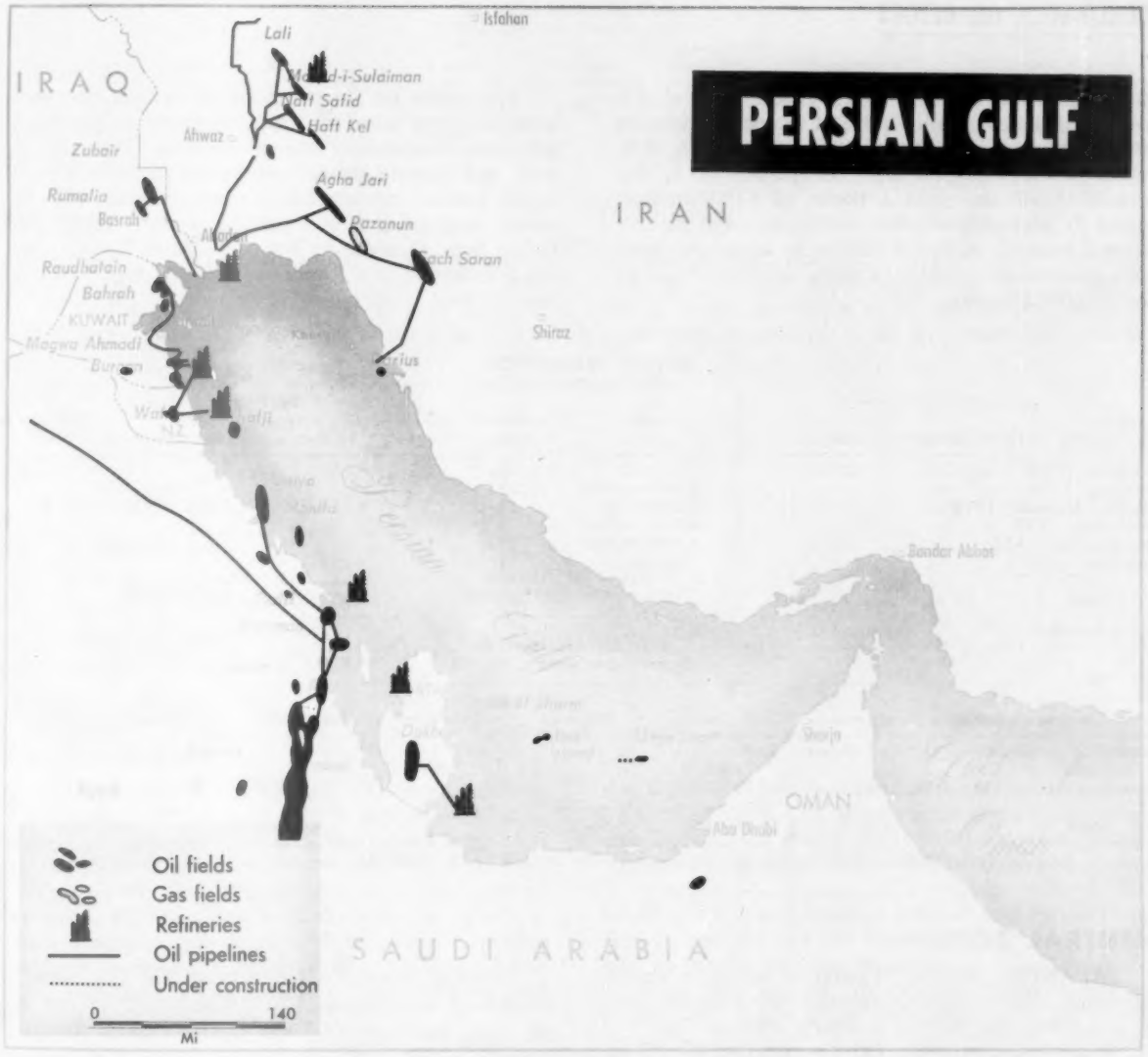
(1) Not in operation.

ISRAEL

ISRAEL opened its first natural-gas pipeline this year. The 18-mile system from Zohar and Kidod gas fields moves supplies to a potash works on the Dead Sea. Initial shipments of 2,000 M.c.f. daily will be increased gradually to 85,000 M.c.f. daily as other contracts are signed. Future industry projects in the country include a 1,000-bbl. refinery at Elat, on the Gulf of Aqaba, site of the input terminal of the 16-in. Elat Haifa pipeline. Plans also have been made for the construction of petrochemical facilities near Haifa refinery. Offshore rights to Israeli waters in the Mediterranean were awarded to a Canadian firm.

ISRAEL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Heletz, 1955	5,000	....	25	2,800	3,506,800	31.0
Negba, 1960	5,200	....	1	.....	.....	...
Total		....	26	2,800	3,506,800	...



ISRAEL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Haifa Refineries, Ltd., Haifa	[1]57,200	4,500 10,000 Vis	.....	.....	8,000 V, 1,900 A
Total	57,200	14,500	.....	.....	

(1) Adding 35,000-bbl. crude unit, 12,000-bbl. vacuum unit, 7,500-bbl. thermal cracker.

KUWAIT

KUWAIT became embroiled in international power politics this summer when Iraq laid claim to the little country soon after Britain withdrew as the shaikhdom's official protector.

In the furor that followed, the British moved more than 3,000 troops up to the Iraqi border, Iraq insisted it had no intention to invade, and other Arab states, as well as most of the world, protested the Iraqi action. British troops later withdrew, and have been replaced by troops from various Arab League states.

The threat, however, had little impact on oil operations except for a temporary delay in projects in some areas, and Kuwait Oil, owned jointly by British Petroleum and Gulf Oil, continued to move about 1,600,000 bbl. daily without interruption.

The country's newest oil field, at Minagish, is scheduled to start up in May with the opening of a 30-mile 22, 24, 26-in. pipeline to Mingal Ahmadi tank farm. Facilities also are being completed that will handle 6,000 bbl. daily of refrigerated LPG for export.

The first wildcat on a new 1,500-sq. mile offshore concession in the Persian Gulf held by Royal Dutch-

Shell will be spudded early in 1962. Shell won what is considered the exploration prize of the decade with an offer to Kuwait of a 50-50 profit split plus a 20% option in the operation once commercial oil is discovered. Shell also paid a bonus of $19.6 million, agreed to multimillion-dollar rentals, and will pay additional bonuses of $44.8 million in equal payments when production reaches 200,000, 300,000, 400,000, and 500,000 bbl. daily.

The option on Shell's operations is only one in a series of steps taken by the government to put itself into other branches of the oil business. The government and Kuwaiti public will hold 60% interest in a newly formed petrochemical company that will be based on surplus natural gas. Its partner will be an Italian firm, Oronzio de Nora, of Milan. Kuwait also has 5% interest in a Rhodesian refining project, which awaited final approval as the year drew to a close.

KUWAIT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bahrah, 1956	7,650	1	....			
Burgan, 1938	3,500-4,800	263	....			
Magwa-Ahmadi, 1952	3,500-4,800	80	....	1,667,059	4,549,276,936	30-32
Minagish, 1959	9,000-10,000	4	....			
Raudhatain, 1955	7,800-10,000	25	....			
Sabriya, 1957	7,500-8,200	1	....			
Total		374	....	1,667,059	4,549,276,936	

KUWAIT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
American Independent Oil Co., Mena Abdulla	[1]40,000	.....	.....		
Kuwait Oil Co., Ltd., Mina-al-Ahmadi	190,000	.....	.....	4,070 Pf	700 A
Total	230,000	.....	.....	4,070	

(1) Adding 100,000-bbl. crude capacity. Due completion in late 1962. Refinery operates on Neutral Zone crude.

NEUTRAL ZONE

JAPANESE INTERESTS started tapping a source of Middle East oil of their own this year with the start of commercial production in Khafji offshore field.

Tokyo-based Arabian Oil Co. opened Khafji in March. Output within a few months rose to 27,000 bbl. daily. It is expected to remain at this level, or a little higher, until permanent shore-based facilities are completed in 1963. These will handle 200,000 bbl. daily.

Development drilling continued in the field despite a second blowout and well fire that occurred when a shallow, high-pressure gas zone was hit in No. 15. At least 25 wells have been completed, most of them in the 6,000-bbl.-daily class.

Onshore, American Independent Oil Co., with a concession over Kuwait's undivided half interest in the zone, and Getty Oil, with rights to Saudi Arabia's interest, raised crude production further with output of nearly 160,000 bbl. daily in a peak month. Aminoil is carrying out a major expansion project. It has already installed a 605,000-bbl. crude-storage tank, largest oil tank in the world, and it opened a new 32-mile 24-in. crude pipeline from Wafra oil field to Mena Abdulla terminal late this year. A new 100,000-bbl. refinery is scheduled to go on stream early in 1962 at Mena Abdulla, where the company already has a 40,000-bbl. plant.

NEUTRAL ZONE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Wafra field:						
Burgan, 1953	3,700	38	....	30,555	88,048,919	24.0
Eocene, 1954	1,200-2,200	116	....	81,394	63,607,691	17.0-19.0
Ratawi, 1955	7,100	27	....	45,840	47,456,827	25.0
Khafji, 1960	5,500	*15	....	10,564	1,909,550	26.0
Total		196	....	168,353	201,022,987	

*Production started in March. Another 7 wells completed by mid-November.

NEUTRAL ZONE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Getty Oil Co., Mina Saud	[1]50,000	.....	.....	.....	.....
Total	50,000	.....	.....	.....	

(1) Dual purpose topping or stabilizer plant.

QATAR

QATAR'S BEST HOPES for increasing output above the present 180,000-bbl.-daily range lies in Shell Co. of Qatar's Idd El Shargi offshore find 52 miles east of the peninsula. The Royal Dutch affiliate has completed three producers from its new "Seashell" platform. The first of the successful wells, 2 Idd El Shargi, found production in Middle Jurassic. Onshore production is operated by an Iraq Petroleum affiliate.

QATAR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Dukhan, 1940	6,550	33	. .	177,013	483,161,132	41.7
Total		33	....	177,013	483,161,132	

*12 wells shut in.

QATAR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Qatar Petroleum Co., Ltd., Umm Said	600	.....	.....	.....	.....
Total	600	.....	.....	.....	

SAUDI ARABIA

ARABIAN AMERICAN OIL CO. produced close to 1,400,000 bbl. daily this year, a gain of about 15% in the country which is already the second biggest oil country in the Middle East.

Part of the increased offtake moved through an expanded pipeline system from Safaniya oil field, which can now deliver 245,000 bbl. daily. Aramco continues to develop Safaniya, drilling wells in the offshore area from a LeTourneau drilling platform used in conjunction with a new tender.

Onshore, the company is developing Abu Hadriya, a 21-year-old oil field, which until last year had only two wells. The field is scheduled to go into production by October 1962 with output from seven wells. After stabilization, the crude will be fed into the Trans-Arabian Pipe Line system to the Mediterranean coast.

Aramco has opened $7.5-million facilities for handling 4,000 bbl. daily of propane and butane from Ras Tanura refinery for export. Special tankers can pick up butane, propane, or mixes.

Saudi Arabia's Shaikh Abdulla Tariki continues to be a key figure in the Organization of Petroleum Exporting Countries, which held its third full-scale conference in Tehran in October.

SAUDI ARABIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Abqaiq, 1941	6,800	60	....	372,387	1,696,900,409	38
Abu Hadriya, 1940	10,115	(1)	....		9,579	35
Dammam, 1936	4,850	26	....	33,781	413,068,038	35
Fadhili, 1949	9,850	(2)	....			37
Ghawar, 1948	7,125	92	....	745,959	2,116,213,505	35
Khurais, 1957	5,200	(3)	....		5,465	33
Khursaniyah, 1956	6,900	5	....	13,930	3,035,778	31
Manifa, 1957	7,900	(4)	....			28
Qatif, 1945	7,350	9	....	20,918	113,795,487	35
Safaniya, 1951	5,560	24	....	219,999	168,247,437	27
Total		216	....	1,406,974	4,511,275,698	

*An additional 72 wells are shut in. (1) 5 wells shut in. (2) 1 well shut in. (3) 11 wells shut in. (4) 6 wells shut in.

SAUDI ARABIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Arabian American Oil Co., Ras Tanura	189,000	.....	.....	26,600 T	15,000 Hyd, 1,210 Alky
				15,500 CR	1,000 Poly, 900 A
Total	189,000	.....	.....	42,100	

SYRIA-LEBANON-JORDAN

THE BREAKUP of Egypt and Syria's United Arab Republic because of Syria's withdrawal posed a threat to Middle East peace this year. But there was no immediate large-scale upheaval, and Syria proceeded with plans to make itself an oil country. Long a transit country for oil from both Iraq and Saudi Arabia, Syria hopes to be producing 40,000 bbl. daily of its own by mid-1964 from Karatchuk field in the northeast part of the country. Crude will be moved to the Mediterranean coast via a planned 400-mile pipeline. Supplies from Karatchuk, which was pre-empted from American interests which discovered it, will be supplemented by crude from nearby Suwaida. This field is being developed by a West Germany company in which Deutsche Erdoel has 80% interest.

In Lebanon, a German company, Gewerkschaft Elwerath, pulled out of an exploration venture after its second dry hole. The company had half interest in Cie. Libanaise des Petroles, in which the Lebanese Government and public hold about half interest. Deliveries of crude from the Sidon terminal of Trans-Arabian Pipe Line continue to be far under capacity because of depressed tanker rates. Shipments over most of the year averaged about 310,000 bbl. daily.

Jordan this year acquired the use of idle Iraq Petroleum Co. pipelines for the purpose of transporting water. Included are a 12 and a 16-in. pipeline and two pumping stations. The lines originally were part of the system from Iraq's Kirkuk field to Haifa refinery on the Mediterranean coast. Crude movements were permanently suspended at the outset of the 1948 Israeli-Arab war.

SYRIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Karatchuk, 1956	6,000	(1)	....	.....	.....	21.0
Suwaida, 1959	5,600	(2)	....	.....	.....	35.0
Total		....	....	.....	.....	

(1) 6-well field. Commercial production at 40,000-bbl. daily via Mediterranean pipeline planned for mid-1964.
(2) 8 wells shut in.

SYRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Syrian Government, Homs	20,000	.....	.....	.....	.....
Total	20,000	.....	.....	.....	

LEBANON REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Iraq Petroleum Co., Ltd., Tripoli	11,550	.....	.....	.....	.....
Mediterranean Refining Co., Beirut, Sidon	12,500	.....	.....	1,400 Pf	.....
Total	24,050	.....	.....	1,400	

JORDAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Jordan Oil Refinery Co., Zerqa	6,400	.....	.....	.....	.....
Total	6,400	.....	.....	.....	

SOUTHERN ARABIA

THE LONG OIL DROUGHT in the Trucial Coast states of the Arabian Peninsula is coming to an end with development work now in progress on two fields.

Abu Dhabi Marine Areas, Ltd., owned two-thirds by British Petroleum Co. and one-third by Cie Francaise des Petroles, plans to start production of 30,000 bbl. daily from Umm Shaif offshore field in mid-1962. This will be stepped up eventually to 120,000 to 150,000 bbl. daily. The company has completed six successful wells, while the seventh, good for 2,000 bbl. daily, is not considered commercial. A 20-mile pipeline outlet from the underwater field to a terminal on the Persian Gulf Island of Das is now being laid.

An Iraq Petroleum Co. affiliate is developing Murban field, an onshore structure lying within a few miles of the coast of Abu Dhabi. Murban was discovered 5 years earlier than Umm Shaif, but more drilling was needed to confirm the commercial prospects. The combined recoverable reserves of Umm Shaif and Murban are estimated at 3.5 billion barrels.

Pan American (Indiana Standard) signed agreements with the sultanates of Qu'Aiti and Kathiri for a 40,000-sq.-mile concession in eastern Aden near the end of the year. In Yemen, John W. Mecom, Houston independent, has drilled one dry hole, and near the year's end was drilling two more. One of these, 1 Zedieye, is projected to 12,000 to 13,000 ft., according to reports.

ADEN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
B.P. Refinery (Aden), Ltd., Aden	[1]137,000	.....	.....	12,000 Pf	3,500 Auto
Total	137,000	.....	.....	12,000	

(1) Adding 12,000-bbl. crude capacity.

TURKEY

TURKISH PROSPECTS brightened near the end of the year when a wildcat drilled by the government's Turkish Petroleum Corp. brought in a 1,000-bbl. discovery in southeastern Turkey in the vicinity of the company's existing small production. The find, made in the same area as a 535-bbl.-daily well brought in a few months earlier, prompted the Turks to start making plans for a 310-mile pipeline outlet to the coast.

Mobil International is the only one of a group of private operators to bring in a commercial find so far. Its field, Bulgurdag, now under development, is 40 miles from Mersin, on the Mediterranean coast, where Mobil has 56% interest in a 65,000-bbl. refinery now under construction.

A new 20,000-bbl. refinery owned by Caltex and the Turkish Government went on stream this summer at Izmit, near Istanbul. Caltex financed the plant and will operate it for 10 years before selling its 49% interest to the government. Caltex supplies the crude under the arrangement.

TURKEY PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Bulgardag, 1960	4,700	....	(1)	.....	.....	36.0
Garzan, 1950	4,750	....	35	3,517	4,020,677	26.6
Germik, 1958	6,300	....	5	490	157,950	20.5
Kahta, 1958	4,000	....	3	.....	250,948	11.0
Raman, 1945	4,400	....	25	3,633	10,044,976	20.6
Total		....	68	7,640	14,474,551	

(1) Four-well field, shut in.

TURKEY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Anadolu Tasfiyehanesi A.S., Mersin	(1)	.....	.....	.....	.....
Caltex-Trukpet, Izmit	(2)	.....	.....	.....	.....
Turkiye Petrolleri, A. O., Batman	[3]6,950	.....	3,000 TCC	.....	1,400 V, 1,300 A
Total	6,950	.....	3,000	.....	

(1) 65,000-bbl. refinery under construction. (2) 20,000-bbl. refinery under construction. (3) Doubling plant capacity.

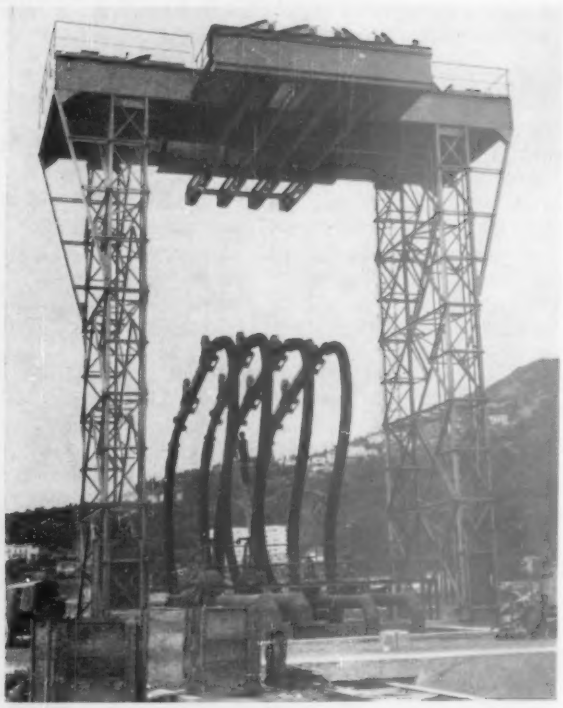
AFRICA

ALGERIA

ALGERIA is now well established as a major oil-exporting country only 6 years after the first commercial discovery. Until the Bizerte conflict prompted Tunisia to temporarily close the Edjele pipeline system, crude movements had risen steadily through both to Edjele and Hassi Messaoud pipelines to 378,000 bbl. daily.

Two new oil fields went into production this year. About 10,000 bbl. daily from the El Agreb-El Gassi structure started moving into the Hassi Messaoud system via a 25-mile 10-in. feeder line. Crude from Ohanet field started moving to the Mediterranean late in fall with the completion of a 321-mile 30-in. pipeline to the Hassi Messaoud line. Mobil International, with 25% interest, and its French partners have completed 15 to 20 wells in Ohenet since the discovery came in as a 1,900-bbl.-daily well.

The closing of the Edjele line in Tunisia spurred CREPS, 35% owned by Shell, to lay a 27-mile 24-in. feeder to the Ohanet system. This will enable it to move part of its Edjele production to the coast via Hassi Messaud in case of further trouble in Tunisia.



A GIANT ARCHWAY at Bougie, Algeria, marks the end of the crude line from big Hassi Messaoud field. The arch handles lines which discharge water used to ballast tankers coming to Bougie for crude cargoes.

More oil and gas was found during the year. Cities Service and two French partners found a "substantial" show at 1,608 ft. in Oulouga 1, 80 miles northwest of Hassi Messaoud. CREPS is evaluating Tin Fouye field, 100 miles west of Ohanet, where three of the first four wells were completed as producers in the 4,000-ft. range. The fourth well tested 1,200 to 1,700 bbl. daily. The field is near Ohanet pipeline. CREPS also is seeking rights to develop In Salah gas field, deep in the French Sahara, where helium has been found in connection with gas. Phillips Petroleum and two French partners late in the year were fighting a wild gas well at Gassi Touil, 90 miles south of Hassi Messaoud.

Gas from Hassi R'Mel field will be flowing into British gas mains at the rate of 100 M.M.c.f.d. by 1964 under a project approved late this year by the British Government. The gas will move from the French Sahara to the Mediterranean coast via a 24-in. pipeline which is now in operation. A liquefaction plant will be built on the coast by Camel, owned jointly by Conch International and the French companies which control the gas supply, SN Repal and CFP(A).

General De Gaulle has offered Algerians political sovereignty over the Sahara Desert provided the French be allowed to exploit the oil they have found. The offer was made as a possible political solution to the 7-year-old Algerian war.

ALGERIA (AND SAHARA) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
El Adeb Larache, 1958	4,200	(1)	....	.....	.....	..
El Agreb, 1959	10,500	5	....	4,630	1,022,000	44
El Gassi, 1959						
Edjele, 1956	1,500-3,000	102	29	33,280	9,816,100	35
Hassi Messaoud, 1956	11,000	66	....	166,960	95,519,100	44
Hassi R'mel, 1956	....	....	....	.....	.....	..
Ohanet, 1960	7,800	(2)	....	.....	.....	40
Oued Guerterini, 1949	1,100-1,600	....	15	100	2,387,500	23
Tiguentourine, 1956	2,600-3,600	(3)	....	.....	.....	..
Zarzaitine, 1957	4,800	75	....	132,420	35,159,700	42
Le Reculee, 1957	5,600	(4)	....	.....	.....	..
Ouan Taredjelli, 1960	3,200	(5)	....	.....	.....	..
Hassi Mazoula, 1959	5,100	(6)	....	.....	.....	..
Ouan Taredert, 1959	5,000	(7)	....	.....	.....	..
Ohanet Sud, 1960	7,800	(8)	....	.....	.....	..
Tin Fouye, 1961	4,300	(9)	....	.....	.....	..
Tan Emellel Sud, 1960	3,100	(10)	....	.....	.....	..
Tan Emellel, 1960	3,100	(11)	....	.....	.....	..
Djebel Onk, 1960	4,000	(12)	....	.....	.....	36
Total Algeria and Sahara		248	44	337,390	143,904,400	

*Total of 116 wells shut in. (1) 14 wells shut in. (2) 15 wells shut in. (3) 23 wells shut in. (4) 7 wells shut in. (5) 4 wells shut in. (6) 1 well shut in. (7) 3 wells shut in. (8) 3 wells shut in. (9) 8 wells shut in. (10) 1 well shut in. (11) 6 wells shut in. (12) 1 well shut in.

ALGERIAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Jersey Standard-CFP-Royal Dutch-Shell, etc., Algiers	(1)	.....	.....	.....	.....

(1) Seven-company combine plans 44,000-bbl. daily refinery.

EAST AFRICA

A HITCH in talks over crude-oil-transportation rates was holding up approval by the Rhodesian Government for a $28 million refinery to be built in Umtali. American Independent Oil Co. will have 15% interest in the project, the Kuwait National Petroleum 5%, and Shell, British Petroleum and other marketers the remaining 80%. The transportation talks were being carried on with officials of Mozambique, through which supplies for the Rhodesian plant will have to pass.

BP-Shell Petroleum Development is starting a deep test on Pemba Island, located a short distance off the African mainland, opposite the Kenya-Tanganyika border. BP and Shell plan to open a $45 million refinery in Kenya by 1964.

In Somalia, ENI and Sinclair Somal continue to explore on their individual concession areas.

EAST AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Mozambique					
Sociedade Nacional de Refinacao de Petroleos—Lourenco Marques	12,000	.....	.....	2,500 Pf	2,000 Un
Total Mozambique	12,000	.....	.....	2,500	
Kenya					
East African Oil Refineries, Mombasa	(1)	.....	.....	.....	.....
Total Kenya	.....	.....	.....	.....	

(1) 40,000-bbl. refinery under construction. Completion due in 1963.

EGYPT

EGYPT this year nationalized 40% interest in Anglo-Egyptian Oilfields as part of a sweeping takeover, or partial takeover, of hundreds of the country's businesses. Combined with 10% ownership previously held by the government, Egypt now has half interest in the company, which operates the country's largest refinery, at Suez, and produces about 20,000 bbl. daily. British Petroleum and Shell, each of which held 31%, and private interests, with 28%, were promised payment in 4% bonds repayable after 15 years.

In a move to cut the bill for product imports, Egypt is adding considerable refining capacity. Most of the equipment in the program is coming from behind the Iron Curtain, including two 20,000-bbl. crude-distillation units from Czechoslovakia.

Domestic crude production averaged about 73,000 bbl. daily this year, with an anticipated rise to 100,000 bbl. daily by 1963. Some of the additional oil is expected to come from an offshore discovery 5½ miles off from the Sinai Peninsula's Belayim field. The well tests 5,000-6,000 bbl. daily of 31°-gravity crude.

The find was brought in by COPE, in which the government holds about 49%. Remaining shares are held by International Egyptian, whose principal owner, ENI, increased its interest this year to 90.74% with the purchase of all shares held by Petrofina. ENI late this year agreed to spend $20 million in exploration on a concession in the Nile Delta area awarded to COPE. The Italian company also agreed to invest another $30 million in a petrochemical development in the Suez vicinity.

Cairo was host in October to the Third Arab Oil Congress. This year's meeting was relatively quiet, with few new issues coming to the fore.

EGYPT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping*	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Abu Durba and other abandoned fields	.....	.....	.....	.....	79,880	
Abu Rudeis (inc. Sidri), 1956	8,000-9,000	3	4	5,350	9,086,425	23.0
Asl, 1948	2,870-3,870	5	2	2,901	30,139,170	22.0
Belayim, 1955	8,000-9,000	19	35	36,050	42,900,000	21.5
Feiran, 1949	8,000-9,000	2	.....	190	918,195	26.0
Gemsa, 1908	400-2,000	.....	.....	.....	1,457,711	41.0
Hurghada, 1913	700-2,500	.....	22	625	40,069,155	22.0-30.0
K'reim, 1958	2,300	12	.....	5,924	1,115,441	17.0-18.0
Ras Bakr, 1958	2,800	36	.....	2,996	1,677,017	22.0-23.0
Ras Gharib, 1938	1,200-2,500	7	116	16,748	174,340,475	26.0
Ras Matarma, 1948	1,940-3,200	.....	2	291	780,781	17.0-18.0
Sudr, 1946	2,700-3,000	2	12	3,084	33,777,808	23.0-24.0
Total	.....	86	193	74,159	336,342,058	

*Includes artificial lift.

EGYPT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Anglo-Egyptian Oil Fields, Ltd., Suez	60,000	.....	.....	3,000 T	.....
Raffinerie de Petrol du Govt., Suez	127,000	2,700	.....	2,700 T	1,300 V, 500 Poly, 650 A

EGYPT REFINING (Continued)
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Societe Egyptienne pour la Raffinage et le Commerce du Petrole S.G.E. ("SERCOP"), Alexandria	[2]6,200	.....	.....	1,200 CR	.....
Total	93,200	2,700	.....	6,900	

(1) Plans to add 20,000-bbl. crude unit. (2) Adding 22,000-bbl. crude capacity.

LIBYA

LIBYA joined the ranks of oil exporting countries in October, just 2½ years after the first major discovery.

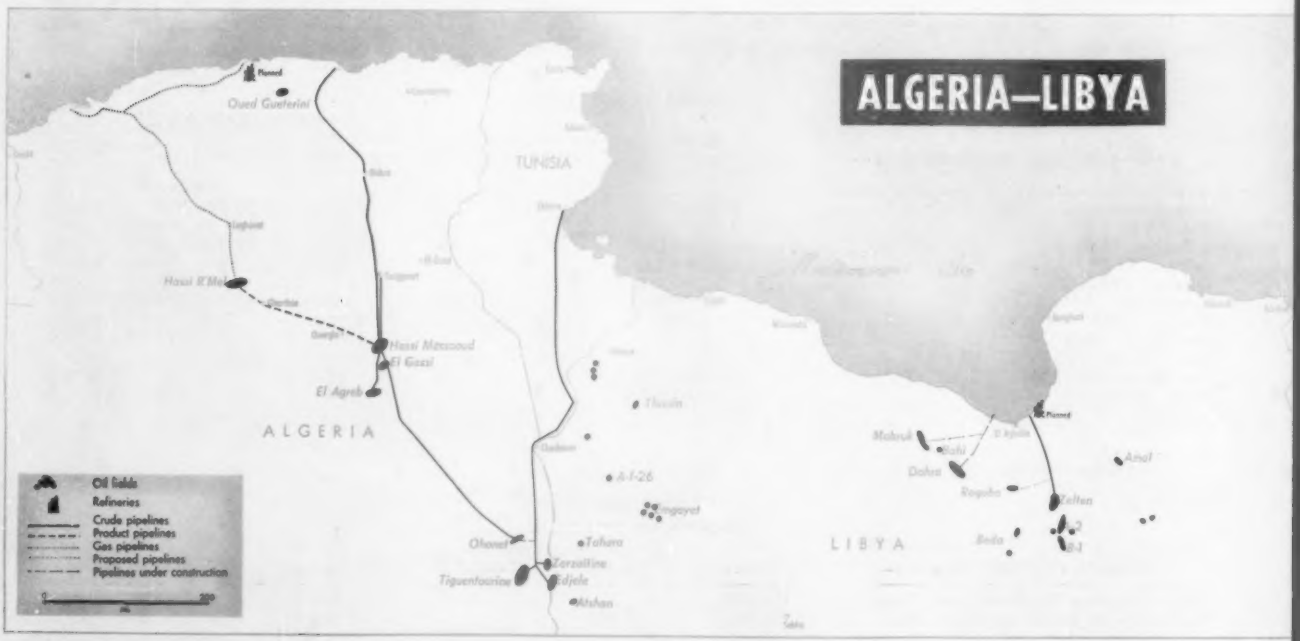
Average shipments of 60,000 bbl. daily since then are expected to double in 1962, and to triple the following year from Esso Libya's Port Brega terminal. The 39°-gravity crude is moving by gravity flow via a 90-mile 30-in. pipeline from the company's Zelten oil field. At least 31 producers have been completed since the original 17,500-bbl. "West of Suez" discovery electrified the oil world in mid-1958. Posted price for the oil is $2.21 per barrel.

Another oil field, Raguba, will be tied into the system with a 50-mile 20-in. spur by late 1963. Eleven producers have been completed on the structure since Esso Sirte, another Jersey Standard affiliate, brought in a 2,250-bbl. well on a farmout from Libyan American, owned by Texas Gulf Producing and W. R. Grace.

More oil will start moving to the coast in mid-1962 when Oasis Oil (Continental, Amerada, Ohio) completes an 88-mile 30-in. pipeline to the coast from Daha field in North Central Libya. A spur to this system is planned from Mabruk field, operated by Esso under another farmout from Libyan American.

The hottest exploration spot of all late in the year was Oasis Block 59, south of Zelten, where at least three important finds have been made. Stepouts to last year's Waha find were comparable to the 4,400-bbl. find. The E-1 find made this year 90 miles east of Waha and Defa fields, tests 1,500 bbl. daily of 37°-gravity crude from a shallow 2,700-ft. depth. A gross 200 ft. of productive limestone is one of the thicker pay zones discovered in Libya. Oasis late this year had eight rigs drilling on the block in an effort to resolve an oil hunter's favorite kind of nightmare, deciding which portion of the prolific acreage to release on the relinquishment date.

Hopes for commercial production in western Libya rose late in the year when CPTL, a French company, brought in a 1,187-bbl. wildcat within about 75 miles of the coast. The find came on the heels of 1,932-bbl. and 1,100-bbl.-daily discoveries in the same area, only about 100 miles from tidewater. Several other operators including Shell, British Petroleum, Oasis, and Gulf have anywhere from one to eight producing wells on their concession areas. But flows seldom above 1,000 bbl. daily combined with long distances to the coast will require extensive work to determine their commercial possibilities.



Pan American and Phillips Petroleum joined the oil play in spring when each acquired concessions that originally were parts of blocks turned back by other companies. Phillips also acquired half interest in 6.7 million offshore acres in the Gulf of Sirte held under concession by Atlantic Refining.

Libya tightened its oil law and put pressure on companies to voluntarily convert existing agreements to the new terms by declaring them ineligible for future acreage unless the change was made. No operators were believed to have made the change. Under the new terms, the law discontinues the depletion allowance, which, in recent agreements, had already been given up. Another change specifies that posted prices, rather than market prices, will be the basis for figuring profits.

LIBYA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bahi, 1959	6,100	2	....	.....	.....	40.0
Bir Tlacsin, 1959	8,976	2	....	.....	.....	44.0
Beda, 1959	5,107	6	....	.....	.....	36.0
Block 59, 1960	6,600	11	....	.....	.....	35.0
Dahra, 1959	4,940	67	....	.....	.....	43.0
El Tmal, 1959	11,290	2	....	.....	.....	35.0
Em-Gayet, 1959	4,100	7	....	.....	.....	35.0
Greater Mabruk, 1959	5,700-9,200	17	....	.....	.....	40.0
Zelten, 1959	5,670-7,657	231	....	.....	.....	37.0
Raguba, 1961	5,560	11	....	.....	.....	...
Hofra, 1960	3,200-3,700	3	....	.....	.....	...
Total		51	25	1,846	8,330,221	

(1) Potentially productive. (2) Field went on production late October at rate of 60,000 bbl. daily, with plans for 125,000 B/D rate for 1962.

MOROCCO

A NEW 25,000-bbl. refinery owned jointly by ENI and the Moroccan Government is scheduled to open in January, giving rise to the question of whether at least part of the plant's capacity will serve as an outlet for Russian crude supplies. The government suspended imports of products from the Franc Zone late in the year because of a balance of payments problems. But alternative sources were used without turning to soviet oil, which is available under an existing trade agreement.

A Moroccan-French company brought in a promising wildcat in western Morocco in October, but commercial prospects still were not clear as the year came to an end. ENI has a drilling program in progress, and Petrofina this year was negotiating for rights to be held jointly with the government.

MOROCCO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Ain Hamra, 1918*	....	....	....	.....	.....	...
Bled ed Defaa, 1952	....	....	1	4	70,572	...
Bou-Draa, 1936*	....	....	....	.....	.....	...
Haricha, 1957	2,700	18	1	1,240	1,298,942	...
Lower Bled Eddoum, 1952	4,300	4	....	109	941,128	...
Lower Bled Khatara, 1954	5,200	....	1	10	163,218	...
Lower Sidi Fili, 1950	4,500	10	....	18	1,114,041	...
Lower Zrar, 1955	5,600	1	....	30	146,700	...
Mers-el-Kharez, 1951	4,300	2	....	25	618,449	...
Oued Beth Baton, 1947	3,300	6	....	21	921,034	...
Oued Mellah, 1949	1,900	10	....	66	479,420	...
Tisserand, 1948*	....	....	....	.....	.....	...
Upper Bled Eddoum, 1952	3,950	....	8	130	849,465	...
Upper Bled Khatara, 1953	4,600	....	9	146	854,520	...
Upper Sidi Fili, 1952	3,950	....	4	41	311,970	...
Upper Zrar, 1955	4,900	....	1	6	22,558	...
Abandoned Fields	....	....	....	.....	538,204	...
Total		149	....	.....	.....	

*Abandoned

MOROCCO REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Ste. Cherifienne des Petroles, Petijean	2,100	.....	1,800 TCC	.....	.....
Soc. Anon Maroc-Italienne, Mohammedia	(1)	.....	.....	.....	.....
Total	2,100	.....	1,800	.....	

(1) 25,000-bbl. refinery under construction.

NIGERIA AND WEST AFRICA

NIGERIAN crude production tripled this year to 64,000 bbl. daily with the opening of a 12-in. pipeline to a new tanker terminal at the mouth of the Bonny River by Shell-BP Petroleum Development Co. This level of output moved Nigeria into nineteenth place among free-world oil countries. Production is scheduled to rise further, and output of 200,000 bbl. daily by 1970 is admittedly a conservative estimate of potential.

The government this year officially awarded offshore blocks off the Niger Delta to Shell-BP, Mobil, Gulf Oil, and Caltex. Shell-BP, which is using a drilling tender for wells in tidal swamp areas, may be the first to test its offshore acreage. Tennessee Gas recently signed formal contracts for two concessions west of the delta covering a total of more than 2 million acres. Mobil has given up its concession in western Nigeria after three dry holes, and will next probe two offshore licenses off eastern Nigeria.

Senegal. A 24,000-bbl. refinery will be built in Senegal by the French Government, a local bank, and six marketing companies in the country. The oil companies, Shell, Mobil, Esso, Texaco, British Petroleum, and CFP will probably have 60% interest in the refinery, which will open in 1963.

Exploration in Senegal is being carried on by Continental Oil and Cities Service in conjunction with French partners. The American firms also are participants in licenses in Mauritania. British Petroleum has half interest in two new concessions in northern Mauritania, one of which is adjacent to BP acreage in the French Sahara.

Gabon, Middle Congo. A drilling program is getting started on offshore areas of the joint Mobil-SPAEF exploration acreage in Gabon. Mobil is the operator for the offshore program, using a new mobile jackup barge towed from the U. S. gulf. SPAEF, operator on shore joint areas, has production of its own on Point Clairette Peninsula, where it retains 100% interest in the concession. SPAEF supplements its Gabon output with an additional 2,100 bbl. daily from adjoining areas in the Middle Congo.

Ghana. Italy's ENI has agreed to turn half interest in a 20,000-30,000-bbl. refinery it will build in Ghana over to the government 10 years after the plant goes into operation. The plant will be located at Tema, 16 miles from Accra.

Angola. Companhia de Petroleos de Angola, a Petrofina company, plans to add 7,500-bbl. capacity to its small Luanda refinery. A portion of the refinery runs is supplied by local fields, which produce about 1,300 bbl. daily.

NIGERIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Afam, 1957	9,000-9,400	8	....	827	2,369,519	36.0-55.0
Akata, 1953	5,500-7,000	....	....	....	....	48.0
Bomu, 1958	7,100-7,500	18	....	20,653	8,076,504	32.0-38.0
Bonny, 1959	7,022-7,048	....	....	....	2,077	30.5
Ebubu, 1958	8,200-8,500	5	....	3,339	1,785,712	26.0-30.0
Igrita, 1959	9,000	1[1]	....	....	431	....
Imo River, 1959	5,900	2[1]	....	....	719	33.0
Oloibiri, 1956	8,000-9,800	6	....	3,694	5,149,435	20.0-29.0
Soku, 1958	10,600-10,650	....	....	....	22,206	33.0
Total Nigeria		39	....	28,513	17,406,603	....

(1) Closed in awaiting production facilities. (2) 6 wells awaiting completion.

WEST AFRICA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping†	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Angola						
Benifica, 1955	8,300	6	....	630	844,180	28.5
Cacuaco, 1958	8,100	1	1	60	135,816	29.6
Galinda, 1959	7,000	2	....	470	157,425	30.0
Luanda, 1957	5,300	4	....	185	405,781	30.2
Uacongo, 1960	8,800	1	....	50	3,829	30.0
Total Angola		14	1	1,395	1,547,031	
Moyen Congo						
Pointe Indienne, 1957	5,000	7	....	2,100	770,000	36.0
Total Moyen Congo		7	....	2,100	770,000	
Total West Africa		72	16	19,435	21,384,131	
Gabon						
Alewana, 1958	2,900	1	....	55	170,000	36
Animba, 1957	1,600	2	1	425	340,000	13

WEST AFRICA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping†	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Asséwé, 1960	2,700	(1)	....	.....	.....	39
Batanga, 1960	6,000	1	....	490	95,000	37
Cap Lopez, 1958	6,000	7	2	1,750	1,820,000	32
M'Béga, 1957	3,000	10	3	3,000	4,850,000	28
N'Tombénijony, 1960	5,000	(1)	....	.....	2,200	41
Ozouri, 1955	2,000	....	3	1,250	3,010,000	22
Pointe-clairette, 1956	4,000-5,000	16	6	4,100	5,840,000	33
Rembo-Kotto, 1960	2,000	(1)	....	.....	.....	49
Simany, 1961	3,450	1	....	170	6,700	33
Tchengué, 1959	3,500	13	....	4,700	2,930,000	31
Wézé, 1961	4,000	(1)	....	.....	3,200	34
Total		51	15	15,940	19,067,100	

(1) Tested production. *Another 42 wells shut in. †Includes gas lift.

WEST AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Companhia de Petroleos de Angola, Luanda, Angola	[1]4,000	.....	.....	.....	.....
Total	4,000	.....	.....	.....	

(1) Additional 7,500-bbl. crude capacity planned, plus 1,000-bbl. Platformer.

SOUTH AFRICA

A JOINT British Petroleum-Shell company will enter the refining industry in South Africa in 1964 with the opening of a 70,000-bbl. refinery at Reunion Rocks, near Durban.

An exploration license over 90,000 sq. miles of Bechuanaland was awarded to Stanvac this year. The rights lie in the central region of the British protectorate. In Southwest Africa, Texas Eastern Transmission made a flying magnetometer survey on its license over the northern part of the country.

SOUTH AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
South African Petroleum Refineries (Pty.), Ltd., Durban	(1)	.....	.....	.....	.....
Standard-Vacuum Refining Co. of South Africa, Ltd., Durban	[2]29,000	.....	15,000 FCC	5,000 Pwr	8,000 Hyd, 800 Poly, 2,000 A
Total	29,000	.....	15,000	5,000	

(1) 62,000-bbl. refinery under construction. Completion due early in 1964. (2) Adding 3,000-bbl. crude capacity.

SPANISH SAHARA

THE FIRST deep wildcat in the Spanish Sahara oil play was abandoned as a duster at 13,910 ft. late this year by Union Oil Co. The well, Daora 1, was drilled 2½ miles inland from the Atlantic coast and a few miles south of the Moroccan border. A second wildcat is planned 25 miles to the southeast. Union is one of a large group of companies which last year won concessions, and agreed to spend $200 million in exploration in the country over a 6-year period.

TUNISIA

TUNISIA'S role as a transit country for oil from the French Sahara was in the spotlight this summer. The government shut down for several weeks the 24-in. crude pipeline from the Edjele area after the outbreak of fighting with French forces in Bizerte. A 20,000-bbl. refinery to be built by ENI will be located at Bizerte, rather than LaSkhira, the Mediterranean terminal of the pipeline, as originally planned.

Campo Duran
Salta
JUJUY
SALTA
FORMOSA
CHACO
TUCUMAN
SANTIAGO
CATAMARCA
DEL ESTERO
CORRIENTES
MISIONES
LA RIOJA
SANTA FE
SAN JUAN
ENTRE RIOS
SAN LUIS
CORDOBA
Barrancas
MENDOZA
BUENOS AIRES
LA PAMPA
NEUQUEN
Neuquen
RIO NEGRO
CHUBUT
SANTA CRUZ
ARGENTINA
Oil fields
Refinery
Storage plant
Division bulk station
Oil pipeline in operation
Proposed products pipeline
Gas pipeline in operation
Proposed gas pipeline
Gas pipeline under construction
0
300
Mi

TIERRA DEL FUEGO is the scene of a major program being carried on by Tennessee Gas Transmission Co. for YPF. In the picture trucks laden with equipment cross a mountain pass on their way to Rio Grande.

ARGENTINA

THE PROSPERING Argentine oil industry is one of the brightest spots in the Latin American oil picture, with local production of around 230,000 bbl. daily going a long way toward supplying domestic demand.

Cities Service moved into the crude-producing picture with the purchase of majority interest in L. R. Development Co. from Carl M. Loeb, Rhoades & Co., a New York investment banking firm. The move gives Cities Service operating control over 23,000 bbl. daily of crude produced under contract with the Argentine Government. Minority partners with working interests are Signal Oil & Gas and Union Texas Natural Gas Corp.

Continental Oil and Ohio Oil have each made exploration contracts on acres in northern Argentina. The companies will explore the adjacent acreage located in northern Argentina, as a joint venture. If oil is found, crude will be sold to the state oil agency, YPF.

Esso and Shell are each getting new exploration and development acreage as replacement for dry-hole blocks where they have been drilling without success for more than 2 years. Other private operators working under contract to YPF include Pan American International (Indiana Standard), which produces over 23,000 bbl. daily in Comodoro Rivadavia, and Tennessee Gas Transmission, which is carrying on a major program in Argentina's half of Tierra del Fuego.

The government this year approved a $70,000,000 petrochemical complex at San Lorenzo to be built by a group of five U. S. companies: Cities Service, Continental Oil, U. S. Rubber, Fish International, and Witco Chemical.

ARGENTINA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.— Daily avg. 1st 6 mos*	Production in bbl.— Cumulative	Gravity °API
Chebut and Santa Cruz Provinces					
Comodoro Rivadavia, 1907	5,900	4,429	174,050	...	22.8-24.5
Tierra del Fuego	6,500	56	20,000	...	41.8
Neuquen Province					
Plaza Huincul, 1918	3,900	514	23,256	...	30.0
Salta Province					
Campo Duran & others, 1930	13,000	72	14,500	...	22.5-54.0
Mendoza Province					
P. Colorados, Barrancas & others, 1934	7,500	330	23,000	...	...
Total		5,401	254,806	842,488,447	

*Estimated.

ARGENTINA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Condor, Avellaneda	900				
Cia. La Isura, S.A., Bahia Blanca	2,000	1,200			
Shell Compania Argentina de Petroleo, S.A., Buenos Aires	[1]27,000	26,000		3,300 T	
Esso, S.A., Petrolera Argentina:					
Galvan	10,000	5,000 Vis			
Campana	[2]75,000	20,000 Vis			7,000 V, 1,000 L, 1,900 A
Dadin (Plaza Huincul)	500				
Manuel Elordi	1,500				
Lottero y Papini-Avellaneda	750				
Yacimientos Petroliferos Fiscales:					
Campo Duran	30,000				
La Plata	120,000	17,000 Vis 4,000	17,000 FCC		15,000 V, 5,500 Alky, 3,000 Poly, 500 L, 1,000 C,* 750 A*
San Lorenzo	27,000	13,600 Vis			
Lujan de Cuyo	40,000	2,000 9,000 Vis	16,000		
Chachapoyas	4,000	1,100			
Dock Sud	7,000	2,400			2,200 V, 440 L
Plaza Huincul	2,800	500			
Total	348,450	101,800	33,000		

*Tons daily.
(1) 33,000-bbl. crude unit under construction plus 16,000-bbl. cat cracker. Due completion early 1962. (2) 10,000-bbl. FCC unit due completion early 1962, plus 3,000-bbl. vacuum unit due for completion late 1962.

BOLIVIA

GULF OIL thinks it may have a multipay field of major proportions northwest of Santa Cruz at Caranda.

Its optimism is based on tests on 3 Caranda which flowed at a rate of 1,570 bbl. daily of 51°-gravity oil. A twin well, No. 3A, drilled after No. 3 had mechanical trouble, flowed better than 1,000 bbl. daily from perforations between 3,140-88 ft. No. 4, a mile west of No. 3A, also came in for better than 1,000 bbl. daily.

Gulf also made a gas condensate discovery southeast of Santa Cruz. The find, 1 Rio Grande, made 9,000 M.c.f.d. from 5,200 ft. The well is on a large structure.

Another company, Chaco Petroleum, completed its 1 Algarrobillo discovery with a flow of 317 bbl. of crude and 6,800 M.c.f. daily of gas. The find is 40 miles north of the Argentine border.

California Standard and Royal Dutch-Shell have suspended drilling operations in Bolivia after drilling five dry holes in a 4-year, $20,000,000 program. Three wildcats, two below 11,300 ft. and one at 15,297 ft., were given up this year.

BOLIVIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Bermejo, 1924	2,624-3,280	5	3	200	2,098,800	20.0-25.0
Camiri, 1927	2,250-4,428	59	20	6,182	22,201,528	50.0-55.0
Guairuy, 1947	1,902-2,624	6	....	300	1,422,184	53.0-55.0
Itapirenda, 1956	2,820-4,150	1	1	65	41,202	50.0-55.0
Madrejones, 1959	13,255-13,600	3	....	1,017	646,052	....
Sanandita, 1926	1,312-2,624	....	7	53	2,175,009	30.0-35.0
Toro, 1955	1,312-3,936	7	16	900	1,491,847	21.0-54.0
Caranda, 1960	5,850	(1)	....	....	....	50.0
Total		81	47	8,717	30,076,622	

(1) Three-well field still shut in.

BOLIVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Yacimientos Petroliferos Fiscales Bolivianos:					
Camiri	1,200				
Cochabamba	6,000				6,200 L
Sucre	4,000				
Total	11,200				

BRAZIL

CRUDE PRODUCTION of over 90,000 bbl. daily has done little to overcome the gloomy fact of Brazil's oil life. This is that despite one of the world's largest basins that has already yielded the proverbial "first bucket" of oil, the country is unlikely to become self-sufficient for petroleum until new exploration tools are developed.

The pessimistic evaluation was made by Walter Link, a geologist who returned to the U. S. after spending 6 years in Brazil unsuccessfully looking for oil. His report to the board of directors of Petrobras recommended that the government agency stop pouring money into a program that had already cost the country from 250 to 300 million dollars in 6 years. His report, which leaked to the press, caused a local political storm.

In contrast, Petrobras narrowed a gap between refining capacity and demand this year with the opening of 90,000-bbl. plant at Rio de Janeiro, adding to existing capacity of about 200,000 bbl. daily. Consumption is rising rapidly above 300,000 bbl. daily.

BRAZIL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Augua Grande, 1951	830-4,300	148	55,185	62,374,937	38.0-42.0
Aratu, 1942*	1,560-2,480	.....	.....	57,222	44.0
Autas Mirim, 1960	3,640	1	9	60,872	32.0
Buracica, 1959	2,480	42	10,807	3,877,652	31.0
Candeias, 1941	3,280-7,900	119	12,811	26,585,609	30.0-33.0
Cassarongongo, 1959	5,400	7	154	78,667	34.0
Dom Joao, 1947	980	261	4,230	6,976,771	33.0-38.0
Itaparica, 1942	1,800-2,500	25	290	725,231	25.0-38.0
Jacuipe, 1956 (1)	2,500	.....	.....	.....	.....
Jequia, 1958	4,950	2	6	14,752	35.0
Lobato, 1939	1,300	4	10	92,554	31.0
Mata de Sao Joao, 1951	1,300-3,700	31	1,429	3,020,849	38.0
Nova Olinda, 1954	8,860	1	.....	1,753	43.0
Paramirim, 1950	460-3,650	2	20	179,584	38.0
Pojuca Central, 1953	4,600-4,790	6	160	107,195	38.0
Rio da Serra, 1951	460-3,635	12	110	123,816	38.0
Rio Sao Francisco, 1959	6,250	1	6	6,792	36.0
Sauipe, 1959	6,400	2	25	9,956	33.0
Socorro, 1958	4,250	1	5	2,288	34.0
Taquipe, 1959	3,950	52	9,880	4,546,992	39.0
Total		717	95,137	108,843,492	

*Shut in. (1) Gas field.

BRAZIL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Cia. de Petroleo de Amazonia, S.A., Manaus	5,000	.....	2,000 FCC	.....	.....
Destilaria Rio Grandense de Petroleo, Uruguaiana	300	.....	.....	.....	.....
Industrias Matarazzo de Energia, Sao Paulo	1,200	.....	.....	.....	.....
"Ipiranga" S.A., Rio Grande do Sul	9,300	.....	.....	.....	60 L, 100 A*
Petrobras, S.A.:					
Cubatao	110,000	9,000	.....	11,000 T 11,000 HF	1,800 Poly
Mataripe	42,000	2,500	12,000 FCC	.....	10,000 V, 690 Poly
Rio de Janeiro	90,000	.....	21,000 FCC	11,800 HF	.....
Refineria de Manguinhos, S.A., Rio de Janeiro	10,000	2,800 4,450 Vis	.....	.....	.....
Refineria Uniao, S.A., Capuava	[1]31,000	.....	35,000 TCC	.....	8,000 V
Total	298,800	18,750	70,000	33,800	

*Tons daily. (1) Adding 6,000-bbl. Platformer and 9,000-bbl. Unifiner.

CHILE

THE EXTREME southern tip of South America and Tierra del Fuego is booming oil country, with production on both the Chilean and Argentine sides of the island, and output on the Chilean mainland.

Chilean production increased sharply this year with the opening of a 50-mile 8-in. pipeline from Daniel field on the north side of the Straits of Magellan, and by October output was over 28,000 bbl. daily.

Further gains are in the making as the result of a successful drilling program by the government company, ENAP, which in the first half of the year completed 32 oil wells and 2 gas wells with only 8 dry holes. ENAP is installing a scrubber at Posesion gas field discovered on the mainland side of the straits last year, and by mid-1962 will be recovering about 3,500 bbl. daily of liquids from 200 M.M.c.f. daily of gas. The gas will be reinjected into formation. A new 100-M.M.c.f.d. gasoline plant at Cullen field on Tierre del Fuego is now going into operation.

ENAP currently has six rigs in operation, four in the south, and two in northern Chile, where three dry holes have been drilled in a wildcatting program.

CHILE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Calafate, 1956	5,600	10	....	860	1,225,300	50.0
Chanarcillo, 1950	7,300	14	....	1,200	2,696,900	59.0
Chillan, 1953	7,200	8	....	750	2,627,200	50.0
Cullen, 1954	5,300	44	....	10,400	13,467,300	42.0
Daniel, 1960	5,600	7	....	1,460	297,200	28.0
Flamenco, 1954	6,200	6	....	400	914,100	42.0
Manantiales, 1954	7,360	6	....	540	1,772,300	50.0
Posesion, 1960	5,800	4	....	....	21,900	59.0
Punta Delgada, 1958	7,400	11	....	2,650	1,245,700	36.0
Sombrero, 1960	7,160	12	....	2,470	8,445,600	42.0
Victoria, 1950	7,360	17	....	1,690	6,430,800	42.0
Chile Total		139	....	22,420	39,144,300	

CHILE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Empresa Nacional del Petroleo, Concon	44,000	6,000 5,500 Vis	12,000 FCC	4,500 T 6,000 SB	1,100 Alky, 10,000 V
Total	44,000	11,500	12,000	10,500	

COLOMBIA

EXPLORERS in Colombia had their most promising success in years this year as a subsidiary of Cities Service tested 1 Payoa at 5,410 bbl. daily and 2 Payoa at 2,200 bbl. daily. The wells, in Middle Magdalena Valley, offset four Santos producers drilled by Sinclair on an adjoining concession. More reserves appeared in the making as Colombian Petroleum, a joint Mobil-Texaco company, brought in a 348-bbl.-daily well in the Cicuco area of North Central Colombia.

The discoveries could not entirely erase the difficulty of maintaining the past level of crude production from existing fields. Output, which exceeded 155,000 bbl. daily over most of 1960, slipped to 142,000 bbl. daily in September and October of this year. A new, tougher oil law also is a source of discouragement. While the legislation does not touch existing agreements, price of doing business will be up on future programs.

The final thread tying International Petroleum to the old De Mares concession was broken this year when the government took over management of Barranca refinery. The refinery was part of a 40-year concession which expired 10 years ago. Intercol operated the plant under a lease for the next decade. The government company, Ecopetrol, broke off a 5-year-old contract with a subsidiary of Forest Oil Corp., of Bradford, Pa., with a $6,000,000 settlement.

COLOMBIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Baul, 1959	5,100	....	....	16	17,000	14.0
Buturama, 1953	6,000	1	....	28	497,888	38.0
Cachira, 1959	12,000	....	1	53	38,205	19.0
Caipal-Ermitano, 1955	5,600	....	9	670	800,000	16.4
Campo Yuca, 1957	4,780	....	2	73	72,596	35.5
Cantagallo, 1943	4,525-7,360	4	8	2,324	9,180,632	20.1
Carbonera, 1939	800	....	2	49	356,784	20.7
Casabe, 1941	4,000	....	388	17,477	150,996,485	20.6
Cicuco, 1956	8,000	17	....	22,021	21,307,291	43.4
Colorado, 1925	4,100	22	12	1,072	2,657,352	39.0
Cristalina, 1959	10,800	1	....	103	106,157	30.0
El Dificil, 1943	5,400	9	....	651	8,015,752	52.0
Floresanto, 1958	....	....	....	....	2,400	....
Galan, 1945	4,000	3	57	2,641	7,456,683	19.2
Gualanday, 1957	7,800	1	....	20	49,338	38.0
Guavio, 1960	10,600	....	....	....	....	37.0
Infantas, 1918	1,250-2,400	1	330	6,446	186,743,766	27.2-28.6
La Cira, 1925	1,100-3,400	1	728	16,375	324,025,379	22.4-25.3
Las Garzas, 1957	8,400	....	....	....	52,379	31.1
Ortega, 1951	5,600	....	3	1,389	2,912,000	27.6
Palagua, 1954	4,000	....	93	10,867	14,368,000	15.9
Penas Blancas, 1958	5,000	....	5	1,897	1,796,095	29.7
Petrolea (North), 1933	950	3	11	2,470	33,802,909	46.0
Petrolea (South), 1937	....	....	....	....	42,178	....
Playon, 1960	13,500	....	....	....	....	30.0

COLOMBIA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Puerto Barco, 1958	6,620-7,140	1	....	12	293,168	45.0
Rio de Oro, 1937	1,200-7,370	5	7	1,120	6,465,946	44.0
Rio Negro, 1960	8,650	....	....	.....	.....	15.0
San Silvestre, 1958	4,000	1	12	391	290,971	19.2
Sardinata, 1950-58	4,000-8,100	7	12	625	2,876,185	43.0
Sogamoso, 1957	11,000	....	2	148	183,000	28.2
Tetuan, 1950	2,500	....	1	206	468,000	22.4
Tibu, 1942-57	500-8,100	35	192	19,577	115,739,163	22-52
Toca, 1960	13,200	....	1	31	15,445	23.0
Totumal, 1951	7,200	3	....	90	374,958	25.0
Velasquez, 1946	4,700-6,000	6	132	22,845	58,273,000	22.5
Violo, 1959	4,000	1	....	32	21,935	38.5
Yariqui, 1954	6,960-8,520	16	8	15,292	1,796,095	29.9
Total Colombia		138	2,016	147,011	952,095,135	

*Includes artificial lift.

COLOMBIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Colombian Petroleum Co., Tibu	5,800	.....	.....	.....	.....
Empresa Colombiana de Petroleos: Barrancabermeja	37,500	16,500 Vis	19,280 FCC	.....	1,205 Alky, 400 L, 4,700 V
La Dorado	4,400	.....	.....	.....	.....
International Petroleum (Colombia), Ltd., Cartegena	32,000	.....	13,130 FCC	.....	17,500 V, 1,670 Poly
Texas Petroleum Co., Guamo	1,100	.....	.....	.....	.....
Total	80,800	16,500	32,410	.....	

CUBA

CUBA has managed to limp along on Russian oil supplies since it nationalized the private industry last year. But higher-than-normal shipments of products are coming into the islands from the Black Sea because of frequent breakdowns at refineries. The government late in the year said it was shifting emphasis in products transport to coastal shipping. This possibly is the result of reported breakdowns in transportation.

CUBA PRODUCTION[1]

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bacuranao-Cruz Verde	....	....	....	.....	.....	...
Catalina, 1956	....	....	....	.....	.....	...
Guanabo, 1956	....	....	....	.....	.....	...
Jarahueca, 1943	....	....	....	.....	.....	...
Jatibonico, 1954	....	....	....	.....	.....	...
Motembo, 1885	....	....	....	.....	.....	...
Santa Maria, 1955	....	....	....	.....	.....	...
Total		....	....	1200	.....	

(1) No field or production data available. Cuban output is estimated to have fallen to 200 bbl. daily or less since revolutionary Castro government seized all oil properties.

CUBA REFINING[1]
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Bacuranao Refining Co., Bacuranao	300	.....	.....	.....	.....
Cia. Petrolera Shell de Cuba, Havana	27,000	.....	.....	5,000 Pf	.....
Esso Standard Oil Co., S.A., Belot	36,500	.....	24,000 FCC	2,600 Pwr	2,000 Hyd, 1,300 Poly, 1,000 A
Refineria Cabaiguan, S.A., Cabaiguan	2,500	500	.....	.....	.....
Santa Maria Oil Refining Co., Havana	600	.....	.....	.....	.....
The Texas Co. (West Indies), Ltd., Santiago de Cuba	20,000	.....	.....	3,300 Pf	4,100 H
Total	86,900	500	24,000	10,900	

(1) All privately owned refineries seized by the government. All are operating on Russian crude.

CENTRAL AMERICA

A CASE OF refinery fever has hit Central America and several refineries are either under construction or planned. The two largest are scheduled to open next year. Golden Eagle Refining, a subsidiary of Ultramar, is building a 60,000-bbl. plant at Portobello, Panama. Refineria Panama, owned jointly by National Bulk Carriers and Continental Oil, is building a 30,000-bbl. plant at Las Minas Bay. Jersey Standard and Shell plan to establish refining capacity in El Salvador, and Texaco has proffered a 5,000-bbl. refinery in Costa Rica.

Some exploration is still being carried on, and Gulf Oil late this year staked a location for an 8,000-ft. wildcat in northern Panama on a tract once held jointly with Union Oil. Ohio Oil is operator for a four-company group that continues a one-rig program in northern Guatemala.

GUATEMALA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Breaux Bridge Oil Refinery Co., Puerto Matias de Galvez	(1)				
Total					

(1) 4,000-bbl. prefabricated refinery completed but not yet in operation.

PANAMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Refineria Panama S.A., Las Minas Bay	(1)				
Golden Eagle Refining Co., Portobello Harbor	(2)				
Total					

(1) 30,000-bbl. refinery under construction. Completion early 1962. (2) 60,000-bbl. refinery under construction. Completion late 1962.

OTHER CARIBBEAN

AT LEAST some of the products from the big refineries in the Dutch West Indies will be allowed to enter the European Common Market on a tariff-free basis. Up to 40,000 bbl. daily will be permitted until a permanent policy comes into effect, after which 50,000 bbl. daily may enter the market area.

Construction will start early in 1962 on a 26,000-bbl. refinery at Kingston Harbor, Jamaica. Esso Standard expects to import Venezuelan crude for the plant.

In the Dominican Republic, refining rights for a 12-year period have been awarded to a Boston businessman, Thomas A. Pappas, and associates.

BARBADOS REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Barbados Union Oil Co., Bridgetown	1,200				
Total	1,200				

JAMAICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Esso Standard S.A., Kingston	(1)				
Total					

(1) 26,000-bbl. refinery planned.

NETHERLANDS WEST INDIES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Lago Oil & Transport Co., Ltd., Aruba	1470,000	313,000 Vis	43,000 FCC		7,000 Alky, 19,200 V
N. V. Curacaosche Pet. Industrie Mij., Curacao	210,000	85,000	35,000 FCC	20,000 T	
Total	680,000	398,000	78,000	20,000	

(1) Adding 1,500-bbl. alkylation capacity.

PUERTO RICO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caribbean Refining Co., Bayamon	[1]15,000	.....	8,000 FCC	.....	10,000 V, 1,300 Poly
Commonwealth Oil Refg. Co., Inc., Guayanilla	87,000	20,000 Vis	30,000 HD	7,454 HF	68,996 V, 10,000 Un, 1,800 Alky, 2,200 Alky
Total	102,000	20,000	38,000	7,454	

(1) Additional 15,000-bbl. crude capacity planned.

ECUADOR

THERE has been little change in the level of Ecuador's relatively small crude production. Anglo-Ecuadorian Oilfields, Ltd., the largest operator, is continuing its development of Ancon oil field. Lobitos Oilfields holds 35% interest in the company, and Esso Standard 19%.

ECUADOR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Achallan, 1919	700-1,200	....	30	11	794,941	35.0
Ahuiguimi, 1922	300-1,000	....	4	7	189,630	34.0
Ancon, 1912	500-5,000	3	1,395	7,191	65,580,705	37.0-38.0
Carmela, 1953	1,700-3,800	....	4	10	55,892	34.0
Carolina, 1930	200-5,000	16	56	323	3,099,939	27.0-28.0
Cautivo, 1918	400-1,500	1	14	20	185,589	35.0
Concepcion, 1930	500-5,000	....	28	103	1,578,990	37.0-38.0
Petropolis, 1939	400-2,800	....	23	99	1,528,637	29.0-30.0
San Raimundo, 1928	300-1,500	....	16	30	321,703	35.0
Tigre, "deep," 1938	4,200	....	54	483	7,694,224	37.0
Tigre, "shallow," 1933	900-1,800	....	39	100	678,761	37.0
Total		20	1,663	8,377	81,709,011	

ECUADOR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Anglo-Equadorian Oilfields, Ltd., La Libertad	12,000	6,000	.....	.....	10 L, 36 V
Santiago Petroleum Co., Cautivo	1,700	.....	.....	.....	.....
Tennessee del Ecuador, Guayaquil	2,500	.....	.....	.....	.....
Total	16,200	6,000	.....	.....	

MEXICO

PEMEX made progress in increasing crude production this year, with output rising to 288,000 bbl. daily for the first half. While this level is nip and tuck with demand, some product imports still are required to supply the country's west coast.

Highlight of field developments is a program getting under way on Santa Ana field, a 2-year-old offshore find in the Bay of Campache. The salt-dome structure is being developed by Pemex by Pauley Petroleum Co. Output was stepped up to 10,000 bbl. daily in July, and a new gathering system can handle 40,000 bbl. daily. This level may be reached in 1962.

Pemex this year busied itself in foreign money markets, and came up with $102,600,000 in European credits for the purchase of petrochemical equipment. The credits will be used to buy gear in France, Germany, Holland, Belgium, and Italy.

Natural gas started flowing to Mexico City this year with the opening of a 500-mile 24-in. pipeline from Ciudad Pemex in the Isthmus of Tehuantepec.

MEXICO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
NORTHERN ZONE—Northeastern District						
Berrendo, 1955	4,117	....	....	.....	2,428	48
18 de Marzo, 1956	7,120	....	....	.....	4,598	36
Francisco Cano, 1949	5,420	5	....	395	2,383,317	48
Lomitas, 1954	4,839	2	....	49	49,745	42
Mision, 1955	7,717	14	2	746	534,512	46
Monterrey, 1950	5,781	1	....	97	744,810	47
Reynosa, 1948	4,613	1	....	99	2,995,246	63
Rio Bravo, 1953	4,377	....	....	.....	8,429	47
Trevino, 1950	5,797	11	15	1,540	6,332,295	37

MEXICO PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Zacate, 1954	2,021	....	....	.....	182	..
Total Northeastern District		34	17	2,926	13,055,562	
NORTHERN ZONE—Northern District						
Barcodon, 1959	4,680	15	....	3,867	1,327,270	17
Constituciones, 1956	6,247	103	9	11,696	10,431,365	19
Ebano-Panuco-Cacalilao, 1901	1,150	330	96	14,281	886,269,251	12
Empacadora, 1959	6,324	....	....	.....	81	..
Tamaulipas, 1956	4,190	89	6	8,085	9,140,249	19
Total Northern District		537	111	37,929	907,168,215	
NORTHERN ZONE—Southern District						
Cabo Rojo, 1953	3,936	....	....	.....	88,355	22
Moralillo, 1948	4,592	18	....	927	9,614,766	12
Naranjo-Cerro Azul (Golden Lane), 1908	2,200	235	1	16,202	1,148,573,008	20
Solis, 1952	2,132	19	....	830	5,940,644	20
San Geronimo, 1960	2,500	1	....	70	28,160	22
Rancho Nuevo, 1960	6,422	4	....	823	273,583	28
Tres Hermanos, 1959	7,007	53	....	10,969	3,366,369	21
Others	....	....	....	10	1,437,676	..
Total Southern District		330	1	29,831	1,169,322,561	
CENTRAL ZONE—Poza Rica District						
Allende, 1955	7,470	....	....	.....	19,342	27
Avila Camacho, 1952	5,189	1	....	13	166,570	35
Cabellal, 1960	10,075	1	....	4	4,371	18
Cerro del Carbon, 1960	9,396	....	....	.....	.....	28
Chote, 1955	7,704	....	....	.....	42,811	24
El Hallazgo, 1957	10,155	52	....	15,006	15,416,100	25
Escobal, 1957	6,636	....	....	.....	1,006	31
Gran Morelos, 1957	9,880	1	....	304	2,226,530	27
Guerrero, 1955	6,578	1	....	238	4,011,771	26
Gutierrez Zamora, 1958	6,414	2	....	104	445,848	17
Hidalgo, 1954	7,720	4	....	705	5,803,767	31
Independencia, 1957	9,293	....	....	.....	5,585	31
Jiliapa, 1958	7,349	21	5	3,739	3,680,970	34
Macarena, 1955	10,332	1	....	11	59,052	22
Miquetla, 1959	6,492	37	....	5,150	1,444,599	35
Nuevo Progreso, 1955	7,177	6	2	880	3,361,310	31
Pasa de Oro, 1959	10,159	1	....	19	23,826	16
Poza Rica, 1930	6,900	56	237	63,620	798,563,081	35
San Andres, 1956	10,286	104	3	31,417	52,120,994	29
Sn. Miguel del Rincon, 1960	10,184	....	....	.....	.....	21
Tajin, 1954	7,950	1	....	27	159,614	34
Tecolutla, 1956	7,556	1	....	100	341,972	31
Others	....	....	....	.....	3,030,713	..
Total Poza Rica District		290	247	121,337	890,929,832	
NEW GOLDEN LANE						
Acuatempa, 1955	4,019	18	....	3,212	10,462,843	21
Boca de Lima, 1956	5,702	....	....	.....	198,266	16
Caristay, 1957	4,885	....	....	.....	.....	23
Chichimantla, 1955	3,987	6	....	1,054	1,216,937	21
Copal, 1957	4,595	....	....	.....	25	15
E. Ordonez, 1952	4,723	12	....	4,157	38,611,995	21
Horcon, 1952	2,804	4	....	434	1,652,485	20
Las Canas, 1956	2,795	....	....	.....	1,717	23
Mesa Cerrada, 1956	3,934	11	....	3,479	3,395,734	22
Mozutla, 1953	4,002	4	....	457	6,834,845	18
Nueva Colonia, 1956	2,936	....	....	.....	114,501	17
Ocotepec, 1953	3,395	10	....	2,231	8,700,154	20
Pital y Mozutla, 1960	7,111	2	....	384	103,905	23
Sta. Agueda, 1953	4,495	45	....	10,399	56,569,419	16
Tihuatlan, 1957	3,063	1	....	53	170,872	22
Xacotla, 1953	3,294	5	....	153	215,648	15
Total New Golden Lane		118	....	26,013	128,249,346	
CENTRAL ZONE—Vera Cruz District						
Angostura, 1953	3,600	8	....	1,993	17,364,156	15
Casa Blanca, 1953	2,220	1	....	3	7,568	40
Tres Higueras, 1955	1,782	2	....	44	156,267	34
Total Vera Cruz District		11	....	2,040	17,527,991	
SOUTHERN ZONE—Isthmus of Tehuantepec						
Acalapa, 1953	2,051	....	3	379	2,444,548	30
Agata, 1956	3,199	23	4	1,522	3,387,414	34
Arroyo Blanco, 1952	2,180	8	7	307	2,189,295	30
Cerro Nanchital, 1960	3,344	....	....	.....	1,554	37

MEXICO PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Concepcion, 1909	2,130	....	....	.....	57,098	41
Cuichapa, 1934	2,100	....	10	629	6,589,123	30
El Burro, 1930	2,460	5	41	1,111	23,634,505	26
El Plan, 1931	1,970	28	104	8,047	114,273,030	30
Filisola, 1921	1,585	....	35	545	24,691,318	22
Ixhuatlan, 1911	1,017	....	74	414	1,843,907	21
Los Soldados, 1953	4,480	11	....	2,176	1,190,919	32
Moloacan, 1948	1,370	....	14	170	1,113,902	26
Nuevo Teapa, 1928	429	....	15	128	875,020	36
Rabon Grande, 1951	2,296	2	18	762	5,709,400	32
Santa Rosa, 1959	1,037	16	4	1,346	516,761	36
Tacuilolapa, 1955	2,920	3	4	195	746,920	36
Tonala, 1928	1,640	....	56	1,187	55,766,773	28
Total Tehuantepec		96	389	18,918	245,031,487	
SOUTHERN ZONE—Tabasco						
Fortuna Nacional, 1949	5,330	2	....	39	318,066	53
Jose Colomo, 1951	5,230	....	7	261	4,004,037	46
La Central	2,852	....	....	.....	69	13
La Venta, 1954	4,698	59	22	7,360	18,747,027	41
Magallanes, 1957	3,829	88	....	12,148	6,838,066	27
Mecoacan, 1958	6,201	3	....	16	159,767	24
Ogarrio, 1957	5,722	127	....	24,344	21,501,586	38
Samaria, 1960	2,640	....	....	.....	.....	..
Santa Ana, 1959	9,520	11	....	4,756	1,327,913	39
Tupilco, 1959	9,687	2	....	3	2,893	27
Vernet, 1928	3,465	6	....	632	1,098,623	48
Yucateco, 1960	6,867	1	....	.....	44	35
Others	....	....	....	.....	711	..
Total Tabasco		299	29	49,559	53,998,802	
Total Mexico		1,715	794	288,553	3,425,283,796	

MEXICO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Pemex:					
Arbol Grande—Arbol Grande	(1)	.....	.....	.....	2,000 A, 21 L*
18 de Marzo—Atzcapotzalco	100,000	.....	.....	.....	.....
Ing. Ontonio M. Amor-Salamanca	[2]40,000	5,000	.....	.....	3,400 Alky, 500 Is, 1,100 Poly 16,000 V, 10,000 PD, 2,800 L, 1,000 A, 100*
Madero—Madero	125,000	8,000 Vis	30,000 FCC	.....	55,000 V, 11,500 PD, 2,500 Poly, 3,200 A
Mata Dedonda—Villa Cuauhtemoc	(3)	.....	.....	.....	.....
Minatitlan—Minatitlan	[4]85,000	.....	12,000 TCC	.....	28,000 V, 1,400 Poly, 800 L
Poza Rica—Poza Rica de Hidalgo	[5]15,000	.....	.....	.....	4,000 PD
Reynosa—Reynosa	10,000	2,000	.....	.....	.....
Total	375,000	40,000	72,000	.....	

*Tons daily. (1) 26,000-bbl. plant being dismantled. (2) 40,000-bbl. crude capacity under construction, plus 30,000-bbl. vacuum unit and 20,000-bbl. fluid cat cracker. (3) Shut down. 14,000-bbl. daily (4) Adding 50,000-bbl. capacity, plus 6,000-bbl. vacuum capacity, 20,000-bbl. visbreaker, 9,500-bbl. Thermofor cracking capacity and 30,000-bbl. platformer. (5) Also 90,000-bbl. crude stabilization unit.

PERU

PERUVIAN crude production remained static at around 52,000 bbl. daily this year, most of it from operations of International Petroleum. The new underwater completion method has been tried out over the past 2 years by Richfield and Cities Service, and the Belco Petroleum, on offshore wells that tap extensions of onshore producing zones. Mobil International this year hit a high-pressure gas zone in its 1 Aguaytia.

PERU PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping*	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Agua Caliente, 1937	900-1,100	....	14	2,084	5,868,661	44.0
Goyonitas-Peru, 1953	3,500-6,000	7	7	606	775,841	33.5
La Brea-Parinas, 1888	3,500	157	1,073	20,834	427,364,106	36.0
Lima Concessions, 1901	3,500	100	521	23,872	140,676,772	38.0
Litoral, 1959	3,200	8	....	586	.....	42.0-48.0
Macquia, 1957	2,137-2,162	10	....	750	460,500	38.0
Mirador, 1955	4,500	31	....	987	.....	38.0

PERU PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Patria Concession, 1943	2,000-5,000	18	128	1,980	7,073,843	40.0
Punta Bravo, 1956	....	....	9	120	196,455	36.4
Sector Tunal, 1955	....	....	2	60	50,803	22.5
Zorritos-Cope, 1863	800-2,000	....	16	20	3,693,706	28.6-36.7
Humboldt, 1960	....	1	....	200	192,089	36.5
Total		332	1,770	52,099	586,352,776	

*Includes gas lift.

PERU REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Cia. de Petroleo Ganzo Azul, Ltd., Pucallpa	600	.....	.....	.....	.....
Empresa Petrolera Fiscal, Iquitos	1,000	.....	.....	.....	.....
International Pet. Co., Ltd., Talara	47,000	20,800 Vis	.....	.....	1,600 V, 250 L, 400 A
Refineria Conchan-California, S.A.	(1)	.....	.....	.....	.....
Total	48,600	20,800	.....	.....	

(1) 67,000-bbl.-daily plant at Conchan is planned.

TRINIDAD

TRINIDAD'S offshore areas hold the best hope for the island's old and highly developed crude-producing industry. Soldado offshore field in the Gulf of Paria already makes a sizable 22,200-bbl. contribution to the island's 124,600 bbl. daily, and a discovery to the north by Trinidad Petroleum Development, and a four-well field still further north found by a California Standard subsidiary hold further hope for more possible commercial offshore reserves. Pan American International (Indiana Standard), Pure Oil, and Sun Oil hold rights to a big offshore concession, off the east coast of Trinidad, that is larger than the island itself. The group will spend $1,000,000 a year for the remainder of a 10-year license.

British Petroleum increased its interests in Trinidad this year with the acquisition of Kern Trinidad Oilfields, which produces 2,900 bbl. daily. Texaco is continuing its buildup of its processing facilities on the island with a planned 2,700-bbl. lubricating-oil plant at its 235,000-bbl. Pointe-a-Pierre refinery.

TRINIDAD PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Balata-Bovallius, 1952	7,200-9,426	....	....	292	.....	29.0-35.0
Brighton-Vessigny & Adjacent Marine Area, 1908	700-7,500	....	....	10,306	.....	
Catshill, 1953	1,400-9,095	....	....	3,489	.....	36.0-46.0
Forest Reserve-Apex-San Franique-Point Fortin East, 1913	1,000-16,115	....	....	31,988	.....	15.0-33.0
Guayaquayare, 1902	500-7,919	....	....	7,290	.....	15.0-49.0
Innis/Trinity, 1956	5,127	....	....	4,338	.....	33.0
Kern-Parrylands-Cruse, 1913	2,000-10,626	....	....	5,016	.....	13.0-30.0
Moruga, East, 1953	9,693	....	....	256	.....	11.0-40.0
Moruga West, 1957	8,604	....	....	3,891	.....	30.0
Oropouche, 1954	2,000-9,077	....	....	420	.....	35.0
Palo Seco-Los Bajos, 1926	460-12,718	....	....	13,841	.....	16.0-33.0
Penal-Barrackpore, 1918	1,300-11,067	....	....	8,608	.....	11.0-35.0
Point Fortin-Point Ligoure, 1908	1,000-8,072	....	....	3,724	.....	15.0-45.0
Quarry-Coora-Quinam-Morne Diablo, 1936	280-14,018	....	....	8,476	.....	16.0-30.0
Soldado Marine, 1955	9,010	....	....	22,241	.....	17.0-35.0
South Domoil, 1959	11,000	....	....	447	.....	47.0
Total Trinidad		1,037	*2,180	124,623	[1]743,000,000	

*Includes artificial lift. (1) Estimated.

TRINIDAD REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Brighton Terminal, Ltd., Brighton	5,000	.....	.....	.....	.....
Shell Trinidad, Ltd., Point Fortin	[1]61,000				10,000 V, 4,000 A
Texaco Trinidad, Inc., Pointe-a-Pierre	[2]235,000	25,000 Vis	28,000 FCC	15,000 Pf 9,000 Rex	60,000 V, 24,000 Un, 2,500 Alky, 1,400 Poly
Total	301,000	25,000	28,000	24,000	

(1) 6,700-bbl. Platformer under construction. (2) 2,700-bbl. Lube oil plant planned. 1964 completion.

URUGUAY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Administracion Nacional de Combustibles Alcohol y Portland Refineria ANCAP—Montevideo, Teja	48,000	2,000	5,000	3,000 SB	10,000 V, 3,000 A
Total	48,000	2,000	5,000	3,000	

VENEZUELA

WHETHER or not Venezuela's giant oil industry is sick or healthy appears to depend on who's diagnosing.

Dr. Juan Pablo Perez Alfonzo, minister of mines and hydrocarbons, insisted late this year that the industry is in good shape with rising production, reduced costs, and increasing reserves. He predicted a 2.8% rise in production to 2,899,000 bbl. daily, an 8% increase in government income, and a 14% return on private oil investment, up from 11% last year.

Oil men, critical of the Venezuelan tax law which in theory gives 60% of the profits to the government, and in practice closer to 70%, tell a different story. They point out that capital expenditures last year dropped to $285,000,000, the lowest in 9 years. Company staffs have been cut to the bone. Fewer than 30 rigs have been making new hole, and investments for the most part have been kept to the bare minimum necessary to maintain efficient operations, rather than for purposes of expansion.

Among the significant developments during the year was the opening of Phillips Petroleum's 42-mile 24-in. pipeline from Morichal oil field to a terminal on the Orinoco River in eastern Venezuela. The system moves 25,000 bbl. daily of the heavy, 9° to 14°-gravity crude. In western Venezuela Mobil International brought in a 2,568-bbl.-daily well on its first try on a Barinas concession acquired from Esperanza Petroleum. The well is near the Mobil-Sinclair pipeline to the Caribbean coast at El Palito, where Mobil has its 50,000-bbl. refinery. Mobil also brought in a 3,860-bbl.-daily well in one of its tests on a 11,416-acre farmout from Creole Petroleum in mid-Lake Maracaibo.

Venezuelan Petroleum Corp. (CVP), the government's new oil company, has brought in three productive wells on the acreage reserved for it near prolific areas operated by private companies.

As the year drew to a close, CVP had made no arrangement to dispose of its oil.

EASTERN VENEZUELA PRODUCTION
State of Anzoategui

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Adjuntas, 1954	6,500-7,200				1,919,817	26.3-28.2
Anaco, 1941	11,290	1		28	72,024	37.3
Araibel, 1954	8,970-10,516	1		1,475	17,753,702	31.5-46.3
Aragua, 1950	7,520-8,820	10	3	887	6,358,510	55.4
Boca, 1951	9,500	16		7,752	38,879,852	33.8-44.3
Bucaral, 1958	9,095-10,180	2		779	688,670	39.7
Cachama Norte, 1952	7,724			89	755,858	29.1
Cachipo, 1957	9,070				27,757	
Caico, 1946	6,500-7,300	6	1	3,939	19,143,220	27.6-37.3
Cantaura, 1951	11,962			138	77,660	42.9
Capacho, 1945	4,115				12,492	23.3
Cerro Pelado, 1951	4,400		1	88	158,943	43.0
Chaparrito, 1957	6,425				13,209	32.9
Chimire, 1948	7,000-7,200	45	9	45,849	194,101,083	35.6-36.6
Dacion, 1951	6,700	12	85	28,407	96,568,045	21.1-21.5
Dakoa, 1951	3,500-5,700	2		154	590,411	36.6
Elias, 1957	5,100-5,300	6	1	2,736	2,064,709	43.3
El Roble, 1939	3,500-11,500	8	3	1,334	48,407,672	44.8-48.5
El Toco, 1948	9,000			827	15,883,827	34.9
Esquina, 1951	4,360			488	2,262,447	34.1
Flecha, 1953	5,736		2		1,507,627	34.9
Fria, 1948	7,300	4	8	4,927	11,261,749	34.6
Galan, 1957	10,392				5,717	31.3
Guanoco, 1913					1,768,422	10.8
Guara, 1942	5,000-10,000	48	195	47,001	340,941,685	23.4-29.3
Guario, 1940	5,000-10,000	9		2,173	36,692,920	45.0
Guere, 1951	7,800	3	10	1,195	20,670,497	37.4
Guico, 1944	4,500-7,000	2		8,778	58,328,976	35.0
Inca, 1948	7,100	1		598	1,902,463	34.9
Isla, 1954	5,470			392	810,799	46.7
Juanita, 1956	4,000			117	574,705	33.9
Junta, 1954	6,720	10	10	3,971	9,389,967	23.7
Kilo, 1955	9,600				150,609	31.0
La Ceiba, 1946	9,244	7		3,567	1,024,395	42.7
La Ceibita, 1953	9,870	4		6,610	12,606,426	38.2
La Freitera, 1957	14,554				57,784	37.4
Largo	13,250-13,360			33	24,643	44.3
La Vieja, 1951	2,750			275	2,748,133	25.7
Leona, 1938	2,200-12,800	25	40	14,577	61,623,611	24.2-26.2
Lobo, 1953	2,600-4,000		8	786	2,684,656	13.7-15.2
Los Mangos, 1950	7,745-8,100			16	708,804	39-41
Luna, 1957	5,720		3	233	381,866	12.3

EASTERN VENEZUELA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Mapiri Este, 1949	9,500	6	....	3,137	12,640,271	34.8
Mata, 1951	11,520	87	34	62,273	112,017,080	30.0-39.1
Maulpa, 1959	13,250	1	....	225	112,361	42.3
Merey, 1932	5,400-5,700	4	182	30,385	37,717,509	10.0-15.2
Nipa, 1945	6,000-8,500	93	88	48,716	250,024,512	31.7-34.2
Oficina, 1937	5,900	74	247	69,180	401,866,215	19.4-22.9
Oscurote, 1953	9,513	24	16	15,645	45,384,197	27.1
Pelayo, 1947	6,650	....	....	....	548,049	26.6
Pradera, 1949	6,430	....	....	1,476	4,017,717	28.1
Quiamare, 1942	5,900-6,650	....	....	472	9,491,101	42.4
Rincon Largo	6,500-8,500	....	....	....	7,045,249	49.7
Rosa, 1958	11,412	2	....	434	656,479	37.6
San Joaquin, 1939	6,560	36	....	4,134	62,617,098	47.4
San Roque, 1949	8,500	13	3	792	11,884,011	50.8
Santa Ana, 1936	8,500	24	....	10,919	50,847,863	35.5
Santa Rosa, 1941	8,500	81	....	41,200	111,680,437	47.3
Socororo, 1940	4,020	....	....	....	147,339	26.6-27.0
Soto, 1949	9,500	27	7	15,004	107,126,629	35.0-36.5
Tacata, 1946	2,200	1	....	119	494,523	37.6
Tapuco, 1952	10,100	7	6	2,407	15,199,113	33.5
Yopales, 1937	4,600	16	37	10,293	27,201,259	21.0
Zaguan, 1960	13,130	....	....	1,316	705,703	38.2
Zanjaz, 1958	13,270	1	....	4,207	3,073,052	35.3
Zapatos, 1935	11,500	1	....	4,214	13,873,934	39.8
Zarro, 1953	11,110	12	4	7,506	20,705,669	26.7
Zocarias, 1959	13,620	1	....	224	218,709	43.4
Zulus, 1957	12,710	2	....	3,729	5,029,179	37.6
Zumo, 1954	9,200	10	9	8,529	25,865,796	22.2
Zumo Norte, 1955	9,760	3	1	1,643	4,644,162	26.0
Total Anzoategui		748	1,013	538,398	2,354,441,578	
Federal Territory of Amacuro						
Pedernales, 1933	1,571	8	....	3,220	51,065,031	21.7
Posa, 1958	1,250	....	....	441	170,623	18.8
Tucupita, 1945	5,600	40	....	5,359	36,436,503	14.7-16.6
Total Amacuro		48	....	9,020	87,672,157	
State of Guarico						
Belen, 1954	4,648	....	....	6	18,473	50.0
Bella Vista, 1952	2,960-4,640	12	29	1,546	8,066,882	24.0
Budare, 1959	4,523	....	....	....	3,919	31.7
Grico, 1946	4,800	....	....	....	177,712	29.1
Idire, 1958	3,000-5,000	....	....	....	68,326	38.4
Las Mercedes, 1942	4,160-4,500	82	116	16,660	99,855,393	31.4
Punzon, 1946	4,400	....	....	61	780,394	36.6
Rositas, 1958	4,320	1	....	104	81,610	28.7
Ruiz, 1949	4,450	2	20	2,452	25,182,126	30.6
Saban, 1947	2,600	2	26	1,569	14,621,301	37.2
Taman, 1949	5,200	1	8	793	10,922,150	38.7
Tucupido, 1947	2,800-5,600	4	14	1,527	14,989,216	39.4
Valle, 1955	2,200-5,500	5	2	317	463,495	35.7-39.0
Total Guarico		109	215	25,035	175,230,997	
State of Monagas						
Aguasay, 1955	8,100-13,400	14	2	9,144	18,688,178	32.2-37.0
Jobal, 1960	1,818	....	....	36	6,617	38.4
Jusepin, 1938	5,300-7,000	33	58	6,836	178,238,516	31.7
Manresa, 1954	2,520-2,620	1	1	363	1,028,382	17.2
Mata Grande, 1946	4,700	3	21	907	7,811,743	26.4
Morichal, 1958	3,312	....	....	172	121,104	13.7
Mulata, 1941	3,500-6,600	13	64	2,449	89,149,518	34.5
Muri, 1942	4,500	....	1	242	15,495,117	28.6
Oritupano, 1954	7,675	26	32	20,364	25,078,797	12.0-22.9
Orocual, 1933	2,954	11	....	2,061	5,727,895	11.8-23.2
Pilon, 1937	3,350-3,600	....	....	....	5,353,701	14.5
Pirital, 1958	450-1,100	....	17	3,026	2,235,351	25.0
Quiriquire, 1928	7,000-7,200	....	472	42,595	585,388,440	16.2
Santa Barbara, 1941	5,000-6,500	40	47	8,176	124,385,557	27.6-37.7
Jacat, 1953	1,830-3,668	....	66	7,894	12,590,179	25.0
Temblador, 1936	3,500-4,500	33	26	8,168	66,306,606	21.8-22.4
Travieso, 1944	4,000	....	9	114	1,554,562	26.3
Uracoa, 1934	4,120	....	....	....	73,119	15.0
Total Monagas		174	816	112,547	1,139,233,382	
Total Eastern Venezuela		1,079	2,044	685,000	3,756,578,114	

WESTERN VENEZUELA PRODUCTION

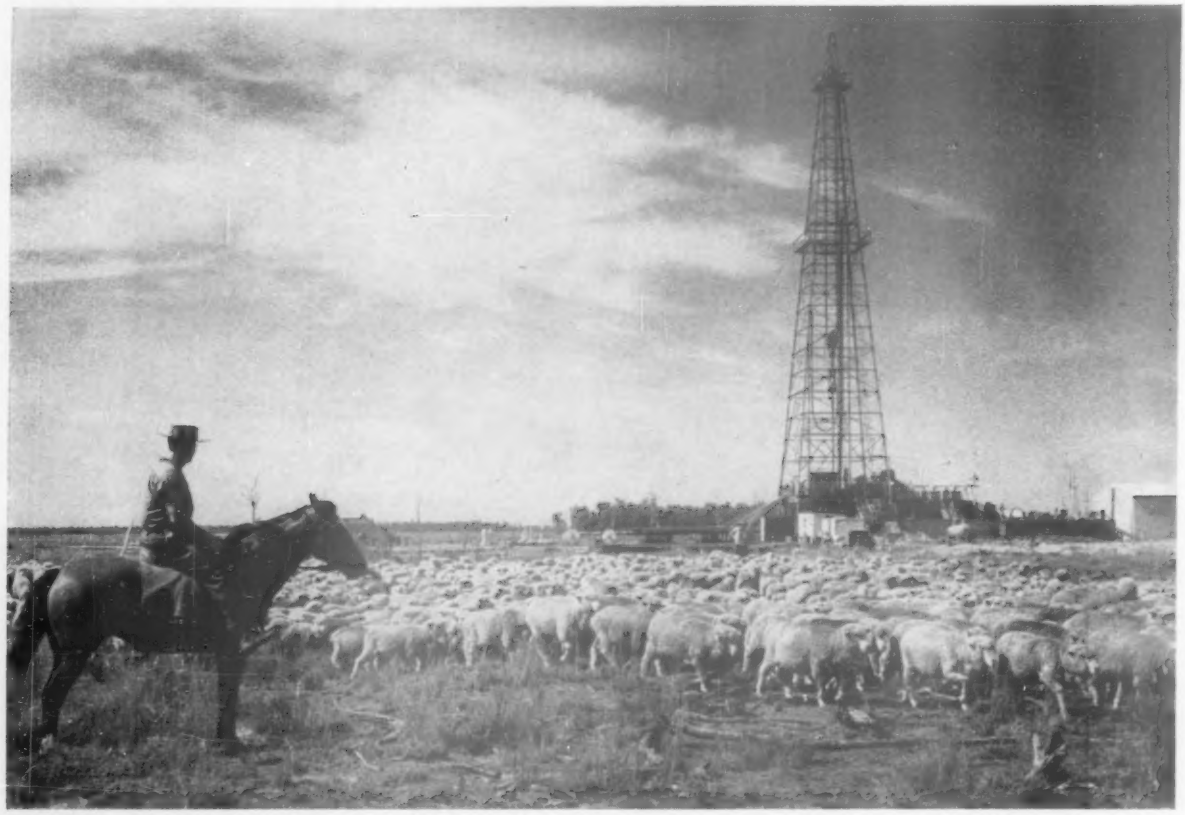
Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
State of Barinas						
Maporal, 1957	10,944	....	1	318	571,969	27.9
Palmita, 1957	10,792	1	....	247	291,513	27.9
Silvan, 1949	10,862	2	....	6,188	7,132,595	27.9
Silvestre, 1945	8,850	2	11	19,564	16,806,069	27.9
Sinco, 1953	8,500-9,100	33	6	40,488	45,893,658	25.8
Total Barinas		38	18	66,805	70,695,804	
State of Trujillo						
Motatan, 1938	8,850	....	....	....	3,093,198	22.4
Total Trujillo		....	....	....	3,093,198	
State of Falcon						
Cumarebo, 1913	1,968	4	14	1,438	55,446,449	46.7
Hombre Pintado, 1927	1,000	....	26	407	6,568,960	20.8-21.6
Las Palmas, 1928	2,750	....	....	....	433,952	29.0
Mamon, 1926	3,350	....	2	30	559,773	31.5
Mene Mauroa, 1921	600-1,850	....	42	716	28,645,177	36.4-38.7
Tiguaje, 1953	3,300	7	9	1,709	3,974,411	26.4
Total Falcon		11	93	4,300	95,628,722	
State of Zulia						
Alturitas, 1950	10,950	....	....	....	27,304	18.9
Amana, 1928	4,560	....	....	....	92,693	27.0
Bachaguera, 1930	3,444-11,500	263	1,347	680,066	1,667,277,648	14.5-35.0
Barua, 1958	10,500	....	....	1,021	1,319,185	18.2
Boscah, 1946	6,500-7,500	....	257	85,536	205,335,918	10.0-10.4
Cabimas, 1917	2,200	127	592	60,740	911,790,958	20.1-25.6
Centro Lago, 1958	13,700	....	....	89	113,871	31.6
Ceuta, 1956	9,600-11,000	18	....	33,278	31,664,998	31.6
Curazaito, 1930	3,500	2	....	....	10,517	19.0
Ensenada, 1946	8,550	1	....	8	632,924	45.9
La Concepcion, 1935	3,148-8,000	3	79	9,623	77,500,500	35.9
Lago Central	13,500	....	....	1,834	700,218	23.5
Lagunillas, 1926	3,000-8,600	445	1,401	850,881	4,306,835,923	16.1-32.4
La Paz, 1925	4,268-8,000	13	61	59,716	620,730,135	32.6
Mara, 1945	5,248	10	30	19,000	305,366,728	29.0-30.2
Mene Grande, 1914	3,050-12,350	28	429	95,056	570,804,847	18.2-36.8
Netick, 1929	6,200	....	....	....	714,483	30.6
Rio de Oro, 1915	1,250-6,650	....	....	....	48,073	....
Sibucara, 1948	13,451	3	....	1,200	31,479,499	36.6
Tia Juana, 1928	3,000	174	1,253	213,957	1,486,778,982	13.8-27.0
Urdaneta, 1957	7,600-8,000	12	....	37,026	37,592,990	10.9-28.2
Others not currently producing:						
Cruces Manueles, 1916, 1927	3,400-5,000	11	1	1,499	141,476,138	33.7
West Zara, 1947	4,250-5,500	11	11	5,710	44,746,757	38.5
Rosario, 1958	14,000-14,700	....	1	2,022	1,892,311	44.0
Total Zulia		1,121	5,462	2,158,262	10,444,933,600	
Total Western Venezuela		1,170	5,573	2,223,367	10,614,351,324	
Total Venezuela		2,249	7,617	2,908,367	14,370,929,438	

VENEZUELA REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Cia. Shell de Venezuela, Ltd.:					
Cardon	255,000	4,500 Vis	35,000 FCC	8,700 T	89,000 V, 3,700 Alky, 2,000 Poly, 3500 L
San Lorenzo	45,000	.....	.....	.....	.....
Calvario	300	.....	.....	.....	.....
Casigua	1,000	.....	.....	.....	.....
La Riviera	300	.....	.....	.....	.....
Creole Petroleum Corp.:					
Amuay	345,800	.....	.....	11,800 Fhy	95,800 V, 17,000 Hyd, 860 L, 23,200 A
Caripito	70,000	45,000 Vis	.....	.....	.....
Mobil Oil Co. de Venezuela:					
El Pulito	55,600	.....	.....	6,500 CR	274 L
Barinas	[1]200	.....	.....	.....	.....
Petroquimica, Moron	2,500	.....	465	350 Cat	1,000 V, 750 Un, 50 Poly
Phillips Petroleum Co., San Roque	3,500	.....	.....	.....	.....
Richmond Exploration Co., Bajo Grande	32,500	.....	.....	.....	10,000 A
Sinclair Oil & Refg. Co., Puerto La Cruz	35,000	12,000 Vis	.....	.....	.....
Texas Petroleum Co., Tucupita	10,000	.....	.....	.....	.....
Venezuela Gulf Refg. Co., Puerto La Cruz	[2]128,300	14,500 Vis	8,650 FCC	12,000 CR	.....
Total	985,000	116,500	44,115	39,350	

(1) Additional 285 bbl. crude capacity planned. (2) Adding 2,271-bbl. hydrofluric acid alkylation unit.



AUSTRALIA'S PRODIGIOUS EFFORT to land itself in the oil column appeared to have paid off as this issue went to press. Union Oil's 1 Moonie was one of the most encouraging tests ever recorded in the country. The scene above could well become commonplace in the country.

AUSTRALIA

AUSTRALIA'S oil fever was rekindled this year by a 60-bbl.-daily discovery in the Great Artesian Basin in Queensland. The find, 1 Cabawin, brought in by Union Oil Co. of California, flowed from a thin Permian sand below 9,900 ft. It is the best well in Australia since the flash-in-the-pan Rough Range find in 1953. A 4-mile stepout to the east later came in dry. But a third well, 18 miles south of the stepout, tested 250 bbl. daily of crude and an equal amount of water.

Exploration, aided by a favorable oil law and government subsidies for drilling, continues to encourage companies to enter the country or expand existing acreage, generally in the form of farmout agreements from local companies. Atlantic Refining this year took half interest in 9 million acres in Victoria. Ohio Oil and Continental Oil added to their acreage by jointly acquiring a 13,100-sq.-mile area in Queensland, subject to an overriding royalty by three local firms.

Stanvac is building a 37,800-bbl. refinery near Adelaide, South Australia, scheduled to open in January 1963. Stanvac's Altoona refinery will be the source of feed stocks for a major petrochemical complex being built near Melbourne. Two of five units of the development, an ethylene and butadiene unit, and a synthetic-rubber plant, went into production late this year.

New Zealand. A gas discovery of possibly major proportions was made at Kapuni, in the Taranaki area of New Zealand, this year by a three-company group, Shell-BP-Todd Oil Services. On the basis of one well, one estimate of the field's potential was as high as 100 M.M.c.f.d.

AUSTRALIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Australian Oil Refining, Ltd., Kurnell	[1]48,000	.....	26,000 FCC	.....	24,000 V, 3,000 Poly
B.P. Refinery (Kwinana), Ltd., Kwinana	80,000	.....	14,000 FCC	18,500 Pf	26,000 V, 8,000 BPH, 500 A
Bitumin & Oil Refineries, Ltd., Laverton	15,000	.....	.....	2,300 Pf	7,000 Un, 840 A
Shell Refining (Australia) Pty., Ltd.: Clyde	[2]20,000	.....	.....	6,700 Pf	.....

AUSTRALIA REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Geelong	50,000	.....	17,500 FCC	6,700 Pf	11,000 H
Standard-Vacuum Refining Co., Ltd., Altona	43,000	.....	25,000 TCC	7,000 Sf	15,000 V, 10,000 CH, 2,000 Alky, 800 L, 2,000 A
Total	256,000	.....	82,500	41,200	

(1) Additional 45,000-bbl. crude capacity planned, plus 18,000-bbl. fluid cat cracker, 3,400-bbl. alkylation unit, and 24,000-bbl. vacuum unit. (2) 24,000-bbl. cat cracker under construction.

BRITISH BORNEO

CRUDE PRODUCTION is gradually declining in British Borneo. Output by midyear was down to 83,000 bbl. daily. This was off about 10,000 bbl. daily from a year earlier, and down from a peak of 120,000 bbl. daily hit in mid-1957. Most of the decline is taking place in Seria field, which has produced more than a half billion barrels of oil since its discovery 32 years ago. Offshore wildcatting had no positive results.

BRITISH BORNEO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping*	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Jerudong, 1955	3,523-4,021	2	....	221	563,893	40-42
Miri, 1911	300-3,050	....	180	1,201	76,160,569	17-46
Seria, 1929	834-10,452	96	232	83,246	533,711,350	10-48
Total		98	412	84,668	610,435,812	

*Includes artificial lift.

BRITISH BORNEO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Sarawak Shell Oilfields, Ltd., Miri-Lutong	46,000	.....	.....	.....	.....
Total	46,000	.....	.....	.....	

BURMA

BURMAH OIL (1954), LTD. is investing $8,400,000 million in an expansion program at Syriam refinery. A new distillation unit which will raise capacity to 19,500 bbl. daily will be completed by July 1963. The company is actively exploring the country, but only gas has been found so far in the program. General Exploration Co. of California this year acquired a 10,000-sq.-mile concession in the Irrawaddy Valley of Central Burma, and later brought Union Oil Co. of California into the venture.

BURMA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Chauk-Lanywa, 1902	2,500	34	417	9,800	313,599,260	36.0
Others	....	....	....	1,200		
Total		34	417	11,000	313,599,260	

BURMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Burmah Oil Co. (Burmah Concessions), Ltd.:					
Chauk	5,800	1,700	.....	.....	.....
Syriam	5,300	.....	.....	.....	.....
Total	11,100	1,700	.....	.....	

FORMOSA

MOBIL, Allied Chemical Corp. and a government company, Chinese Petroleum Corp., are building a 100,000-ton per year urea plant on Formosa. The plant will operate on natural gas discovered 2 years ago. Asiatic American, Inc., of Oklahoma City, will invest $1,000,000 a year in exploration on the island under a 20-year renewable contract with the Nationalist Chinese.

FORMOSA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Chinese Petroleum Corp., Kaoshiung	[1]39,000	4,000 Vis	10,000 TCC	2,800 Cat	6,000 Un, 890 Alky, 240 A[2]
Total	39,000	4,000	10,000	2,800	

(1) Additional 5,000-bbl. crude unit planned plus 5,000-bbl. Sinclair-Baker reformer and 5,000-bbl. Unifiner. (2) Metric tons.

INDIA

INDIA is one of the touchiest of the world's troubled oil spots, with the government continuing its unrelenting pressure on oil companies to reduce prices and take Russian oil.

The latest move toward this end was made late in the year when the government arbitrarily ordering discounts on products totaling $31,000,000 to be spread over imports, locally refined products, and distribution and marketing charges. By allocating only enough foreign exchange to importers to bring in the required level of products at the discounted rate, companies are left with several unacceptable choices, unless a compromise is reached.

They can try and get products from the Persian Gulf at discounted prices, and risk a general price reduction in the Eastern Hemisphere. They can import products at a loss, take Russian products as an alternative, or stop importing products when their foreign exchange is used up. In this event, a new government company which already is importing some products from the Black Sea would gain an additional foothold in the country's market. Refiners in the country are seeking permission to expand their capacity, but among the reasons for the delay is India's desire to run Russian crude, which can be paid for in rupees.

India also would prefer to operate new refining capacity itself, and this goal will be partially met with the opening soon of a 15,000-bbl. refinery at Nunmati. The plant will be supplied by a 260-mile 16-in. pipeline from the Nahorkatiya producing area. A 460-mile 14-in. extension will be laid to Barauni, where construction has started on a 40,000-bbl. plant. Both refineries are being built with Russian and Romanian help. The pipeline system and field operations are handled by Oil India, Ltd., owned jointly by the government and Burmah Oil Co. A new agreement between the partners under which each has half interest is expected to set the pattern for any future exploration and production programs in the country which will be carried on by private firms.

India has budgeted $44,000,000 for exploration in the 1961-62 period, almost as much as was spent over the past 5 years. A Russian and Romanian-assisted drilling program has brought in two fields north of Bombay, at Angleswhar and Cambay. Shipments of Ankleswhar crude are now moving to Bombay for refining. Part of India's program will be financed by a $100,000,000 credit negotiated this year with Italy's ENI. The credit will be used to purchase Italian-made oil-field, pipeline, and processing equipment.

INDIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Digboi, West, 1890	3,000	6	[1]70	1,035	*49,350,722	37.5
East Kharjan, 1948	4,000	36	....	2,380	10,056,765	37.5
Moran, 1956	10,900	[2]	....	.....	14,886	33-36
Nahorkatiya, 1953	9,500	[3]6	....	4,731	8,158,743	34.0
Cambay, 1959	6,000-7,000	[4]	....	.....	.....	....
Ankleswhar, 1960	4,500-4,700	[5]	....	.....	.....	....
Kalol, 1961	5,000	[6]	....	.....	.....	....
Total		48	70	8,146	67,581,116	

*Since July, 1906. (1) Another 346 wells shut in. (2) Nine wells shut in. (3) Another 76 wells shut in awaiting completion of pipeline. (4) New government field with 12 potential producers. (5) Government oil find, 8 potential producers. (6) Government field discovery.

INDIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Assam Oil Co., Ltd., Digboi	9,700	.....	.....	.....	1,700 L
Burmah-Shell Refineries, Ltd., Bombay	56,000	.....	12,000	6,700 Pf	.....
Caltex (India), Ltd., Visakhapatnam	15,000	.....	8,400 FCC	.....	7,500 V, 850 Poly
India Refineries, Ltd.:					
Barauni	[1]	.....	.....	.....	.....
Gauhati	[2]	.....	.....	.....	.....
Gujarat	[3]	.....	.....	.....	.....
Standard-Vacuum Refining Co. of India, Bombay	38,000	.....	7,700 FCC	3,800 T	250 Poly, 750 A
Total	118,700	.....	28,100	10,500	

(1) 40,000-bbl. refinery under construction. (2) 15,000-bbl. refinery nearing completion. (3) Government plans 30,000-bbl. refinery.

INDONESIA

THE OIL INDUSTRY in Indonesia is operating in an uncertain state, not knowing where it stands in relation to the government. President Sukarno in September ordered the three private companies—Stanvac, Caltex, and Royal Dutch-Shell—to turn over 60% of their profits to the government, and decreed that companies must immediately start working as contractors for the country. Indonesia officially nationalized the private industry last year, and Sukarno's move came after months of unsuccessful negotiations with the private industry. But companies have been producing oil as per usual, and a further agreement between the government and private operators seemed necessary before the situation could become clear.

At stake is by far the greater share of 429,000 bbl. daily of crude produced in Indonesia. Caltex is the largest operator, averaging about 218,000 bbl. daily. Stanvac produces 70,000 bbl. daily, and Shell, 88,000 bbl. daily. One government company, Partamin, produces about 29,000 bbl. daily from old properties taken over the Shell's concession rights expired. Another government company, Permina, produces about 24,000 bbl. daily from properties in North Sumatra which were never returned to Shell following end of World War II.

Japanese drilling operations got under way at mid-year in a program designed to develop at least 14,500 bbl. daily of North Sumatra crude within 3 years for Japanese refineries. The Japanese will advance $52,-300,000 in credits and assistance to Permian over a 10-year period for development of two fields in the Atjeh region. The Japanese will be repaid in oil.

Shell opened its last untapped oil reserve in Indonesian Borneo this year with the opening of a 160-mile 20-in. pipeline from Tandgung field to the coast of Balikpapan. The line will move 40,000 bbl. daily of waxy crude in a 30% water suspension.

A Canadian company, Asamera Oil Corp., reached an agreement with Permina for an exploration and development program on a large block in North Sumatra. Profits will be split on a 60-40 basis, with the Calgary-based company taking the smaller half.

Timor. Shows of oil have been encountered on the Portuguese side of Timor island, where two American independents and an Australian firm are carrying on a joint exploration program.

INDONESIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping*	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Kalimantan (Indonesian Borneo)						
Anggana-Muara, 1902	380-3,200	...	80	1,103	70,390,000	20.6-32.4
Balik Papan (Klandasan), 1903	740-765	...	1	9	254,000	15.3
Bunju, 1930	2,020-7,850	40	5	†9,000	†24,130,830	24.5-32.6
Sambodja, 1910	160-4,400	....	48	631	58,160,000	23.7-31.4
Sanga Sanga, 1897	430-2,900	....	81	2,261	158,778,000	20.7-32.6
Sangatta, 1940	1,640-4,200	....	....	.....	1,000	36.0
Tandjung, 1938	2,500-4,300	....	(1)	308	1,290,000	38.8
Tarakan, 1906	195-2,400	2	372	2,822	182,469,000	18.2
Total Kalimantan		42	587	16,134	495,472,830	
Java						
Kawengan, 1926	1,750-2,700	...	76	3,078	74,642,000	33.2
Kruka, 1929	970-1,600	....	42	398	9,675,000	28.3
Ledok, 1896	320-3,200	....	....	.....	21,300,000	43.0
Lidah Kuldon, 1896	490-1,330	....	....	.....	33,369,000	24.5
Nglobo-Semanggi-Banjuasin, 1897	370-3,350	....	....	.....	18,604,000	43.0
Total Java		....	118	3,476	157,590,000	
Ceram						
Bula Lemun, 1897	240-920	....	....	.....	8,203,000	23.0
Total Ceram		....	....	.....	8,203,000	
Sumatra (South)						
Abab, 1957	6,000	3	....	574	2,017,153	35.0
Babat, 1901	100-1,050	...	....	.....	8,494,000	36.5
Badjubang, 1927	2,700-3,300	6	29	12,180	36,177,210	44.7
Benakat, 1933	1,500	29	85	11,473	89,400,061	36.0
Betun, 1949	6,500	1	3	167	3,830,500	35.0
Betung, 1923	180-950	...	....	.....	2,165,770	40.5
Deras, 1951	6,000	1	....	309	551,743	35.0
Djirak, 1930	900	1	53	2,778	43,561,938	37.0
Gunung Kemala, 1938	6,200-6,340	9	2	2,149	16,213,000	38.0

(1) 60-well field opened by new pipeline in October. †Estimated.

INDONESIA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping*	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Karang Ringing, 1903	160-1,200	....	....	.....	1,510,000	42.5
Keban, 1941	1,180-1,800	2	....	93	118,000	55.7
Kenali Assam, 1931	1,150-4,020	22	106	[1]8,700	71,669,160	23.8-40.5
Kluang, 1914	2,300-2,600	....	....	.....	28,704,000	40.0
Kruh, 1941	3,300	....	....	.....	1,474,777	38.0
Limau, 1928	4,450-5,350	75	58	47,762	90,730,000	28.0
Mangundjaja, 1935	660-2,200	1	43	1,404	18,188,000	24.8
Meruo Senami, 1938	2,400-2,650	2	....	[1]60	393,620	45.9
Prabumlih West, 1953	4,740-5,640	....	6	943	7,318,000	32.4
Radja, 1940	6,500	16	1	1,637	13,913,891	46.0
Sei Taham, 1903	300-1,150	1	6	153	28,846,000	43.1
Selo, 1937	1,900	3	....	574	2,017,153	35.0
Setiti, 1936	1,850-1,970	1	13	[1]730	1,911,300	27.2
Suban Djerigi, 1905	1,300-2,500	....	21	318	37,253,000	43.7
Sungei Gelam, 1958	1,370-4,700	2	....	60	87,750	45.8
Talang Akar-Pendopo, 1922	2,800	103	85	26,734	308,472,204	37.0
Tandjung Tiga, 1940	4,400-4,600	10	40	8,263	27,860,000	28.5
Tempino, 1931	1,930-2,700	4	103	[1]6,980	71,023,060	41.1
Tg. Luntar, 1912	2,200-2,800	....	....	.....	4,312,000	56.0
West Tandjung Miring, 1938	4,210-5,040	4	....	810	745,000	28.4
Others	....	....	....	.....	111,674	....
Talang Djimar, 1937	3,600-4,200	23	113	15,618	119,253,000	28.5
Total South Sumatra		319	767	140,469	1,038,322,964	

(1) Estimated.

Sumatra (Central)

Andan, 1958	....	....	5	953	486,388	34.0
Bekasap, 1955†	2,500	....	....	.....	12,269	36.0
Duri, 1940	600	....	258	43,627	29,600,161	22.0
Kotobatak, 1952†	4,600	....	....	.....	4,896	32.0
Lirik, 1939	1,600	....	15	3,983	3,606,341	34.0
Minas, 1944	2,400	45	105	175,212	344,371,418	36.0
Molek, 1956	....	....	1	92	44,925	34.0
North Pulai, 1957	1,800	....	11	3,316	3,796,256	34.0
Pungut, 1951†	2,800	....	....	.....	48,140	38.0
Sago, 1940	1,800	....	57	16,677	28,604,799	34.0
Sebango, 1940†	1,000	....	....	.....	2,369	32.0
South Pulai, 1958	....	....	4	606	413,539	34.0
Ukuil, 1940	1,800	....	6	493	504,264	34.0
Total Central Sumatra		45	462	244,959	411,495,765	

†Shut in.

North Sumatra

Djrajeu, 1929	2,520-2,590	....	....	.....	559,000	54.5
Gebang, 1936	2,970-3,400	....	....	.....	135,000	54.0
Pace, 1939	2,520-2,590	....	....	.....	559,000	34.5
Pangkalan Susu, 1927	1,550-2,100	....	....	.....	6,287,000	56.0
Perlack, 1900	160-2,200	....	....	.....	47,870,000	57.0
P. Tabuhan, 1937	3,300-3,500	....	1	[1]720	3,675,759	52.5
Pulu Pandjang, 1928	1,640-2,400	....	....	.....	11,243,000	55.5
Rantau, 1929	1,040-2,560	....	80	[1]22,880	63,915,174	48.5
Seranga Djaja, 1926	3,560-4,150	....	....	.....	7,551,000	64.5
Telaga Said D.K.G., 1893	210-720	....	....	.....	23,621,000	51.5
Total North Sumatra		....	81	23,600	165,415,933	
Total Sumatra		364	1,310	409,028	1,615,234,662	
Total Indonesia		406	2,015	428,638	2,276,500,492	

(1) Estimated. *Includes artificial lift.

INDONESIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
N.V. de Bataafsche Petroleum Mij.:					
Balik Papan	75,000	.....	.....	.....	.....
Pladju	110,000	10,000	.....	15,000 T	.....
Tjepu	4,600	.....	.....	.....	.....
Wonokromo	3,200	.....	.....	.....	.....
N.V. Standard-Vacuum Pet. Mij., Sungei Gerong	77,000	22,500	22,500 FCC	.....	26,000 V, 900 Alky, 1,800 Poly
Total	269,800	32,500	22,500	15,000	

JAPAN

JAPAN'S fast-growing refining industry reached the 1-million-barrel-daily-capacity level this year, 11 years after the country's bombed-out refineries reopened for business at less than a tenth of their present capability. The processing growth is scheduled to keep on going, with crude capacity of over 2.5 million barrels daily expected by 1970.

The Japanese Government next year will remove foreign-exchange controls with which it controls the imports of crude and products, and the chief question preoccupying the industry as the year drew to a close was whether or not some regulation should be made in order to prevent a possible flood of gasoline in Japanese markets. Until now, exchange controls have been used to gear crude imports to the need for gasoline, with additional supplies of fuel-oil requirements made up with imports of the product.

The ending of exchange controls also is bringing about a change in the local exploration and producing industry. Because of the low cost of imports, the two domestic producers, Teikoku Oil and Japex, are shifting their emphasis from crude to natural gas and LPG production. The energy equivalent of gas production is already greater than that of the 13,500-bbl.-daily crude output. Gas output will further increase in October 1962 when a 210-mile pipeline is completed from Kubiki field to Tokyo. The system will move 17.5 M.M.c.f.d.

The Japanese refining and marketing picture has both powerful independents and companies affiliated with the internationals. Stanvac has 55% interest in Toa Nenryo Kogyo; Caltex, 50% interest in Nippon Petroleum Refining and Koa Oil; Tidewater, 49% interest in Mitsubishi; and Shell 50% interest in Showa Oil.

Tokyo-based Arabian Oil Co. this spring started importing crude from its Khafji offshore oil field off the Neutral Zone in the Persian Gulf. Shipments later leveled off at about 30,000 bbl. daily. They will rise to 200,000 bbl. daily by 1964 when permanent terminal facilities are completed in the Neutral Zone. Another Japanese group is investing $52,300,000 in North Sumatra. It will be reimbursed with crude payments expected to reach 14,500 bbl. daily in 3 years.

JAPAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Amarume, 1960	2,600	9	....	258	44,995	33.0
Asahikawa, 1908	510-1,130	...	160	88	4,555,102	20.4
Barato, 1958	1,300	10	14	252	131,639	29.3
Fukura, 1958	2,600	1	.....	22	153,462	45.3
Hachimori, 1938	570-2,150	2	22	40	628,564	17.1
Higashi Niigata, 1959	4,700	3	....	13	4,303	49.9
Higashiyama, 1893	180-2,580	119	5	133	7,728,730	26.3
Innai, 1923	970-3,490	1	202	383	7,632,435	19.5
Kita Konoura, 1958	3,630	...	....	.....	1,493	24.0
Kotaki, 1938	760-1,890	...	65	56	654,930	18.7
Kubiki, 1934	3,210-4,020	19	....	500	342,511	27.4
Kurokawa, 1912	440-1,720	...	82	55	7,671,060	16.0
Mitsuke, 1958	6,000	10	....	3,509	1,131,165	37.0
Niitsu, 1896	190-4,730	....	429	375	18,526,862	18.2
Nishiyama, 1888	660-5,940	4	215	106	18,891,650	35.0
Offshore Tsuchizaki, 1959	2,000	6	.....	806	140,509	31.1
Sarukawa, 1958	2,600-4,000	18	....	1,096	433,415	35.0
Shonai, 1944	340-950	4	30	164	1,277,304	18.7
Tamugiyama, 1956	4,000	7	....	183	288,666	47.6
Yabase, 1933	220-5,620	202	301	4,255	26,697,882	38.0
Total Japan		415	1,525	12,294	96,936,677	

JAPAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Arabian Oil Co.	(1)	.....	.....	.....	.....
Daikyo Oil Co.:					
Yokkaichi	65,000	.....	3,500 HD	3,000 HF	14,000 V, 1,770 L, 3,000 CH, 220 Poly, 1,450 A
Umaokoshi	(2)	.....	.....	.....	.....
General Bussan, Sakai	(3)	.....	.....	.....	.....
General Oil Co., Kawasaki	38,000	.....	.....	6,000 Pf	.....
Idemitsu Kosan:					
Tokuyama	120,000	.....	7,000 FCC	13,000 Pf	20,000 V, 12,000 CH, 870 A
Anegasaki	(4)	.....	.....	.....	.....
Koa Oil Co.:					
Marifu	88,300	.....	5,500 FCC	3,300 Pf	30,000 V, 5,500 C
Anegasaki	(5)	.....	.....	.....	.....

JAPAN REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Kyushu Oil Co., Tsurusaki	(6)	.....	.....	.....	.....
Maruzen Oil Co.:					
Goi	(7)	.....	.....	.....	.....
Shimotsu	37,500	.....	5,000 FCC	6,000 Pf	14,460 V, 4,500 CH, 1,750 L, 1,300 A
Matsuyama	50,000	4,500 Vis	.....	4,000 Pf	4,000 CH
Sakai	(8)	.....	.....	.....	.....
Mitsubishi Oil Co.:					
Kawasaki	93,940	.....	.....	5,000 Pf	3,800 V, 12,500 CH, 1,030 L, 1,500 A
Mizushima	40,000	.....	.....	3,600 Pf	20,000 V, 7,200 CH
New Asia Oil Co.:					
Hokodate	12,000	.....	.....	.....	1,500 V, 350 A
Yokohama	43,000	.....	.....	6,300 Pf	750 V, 3,500 CH
Nichimo Oil Ref. Co., Kawasaki	21,000	.....	.....	.....	.....
Nippon Mining Co.:					
Funakawa	19,350	.....	.....	.....	2,000 V, 1,100 L
Mizushima	40,000	.....	.....	6,000 HF	2,000 CH
Nippon Oil Co.:					
Nagoya	(9)	.....	.....	.....	.....
Akita	4,000	.....	.....	.....	2,140 V, 350 A
Niigata	10,000	.....	.....	1,600 Pf	2,000 V, 300 A
Kashiwazaki	1,800	.....	.....	.....	.....
Nippon Pet. Refg. Co.:					
Negishi	(10)	.....	.....	.....	.....
Yokohama	70,000	.....	6,300 FCC	3,300 Pf	10,000 V, 7,980 L, 310 A
Kudamatsu	20,000	.....	.....	1,900 Pf	4,500 V, 1,550 L, 330 A
Muroran	7,500	.....	.....	.....	.....
Showa Oil Co.:					
Kawasaki	52,000	.....	.....	1,500 Pf	3,000 V, 6,000 CH, 1,500 L, 220 A
Hirasawa	3,000	.....	.....	.....	1,000 V, 230 A
Niigata	11,000	.....	.....	.....	1,600 V, 150 A
Showa Yokkaichi Oil Co., Yokkaichi	60,000	.....	12,000 FCC	.....	23,500 V, 370 A
Taiyo Oil Co.:					
Kameoka	38,500	.....	.....	.....	250 A
Kawasaki	(11)	.....	.....	.....	.....
Teikoku Topping Plant Co., Kubiki	(12)	.....	.....	.....	.....
Toa Nenryo Kogyo:					
Wakayama	57,000	.....	10,200 FCC	4,700 Fhy	15,500 V, 1,250 Alky, 5,000 CH, 5,360 L
Shimizu	43,500	.....	.....	4,600 Pwr	3,800 V, 660 L
Kawasaki	(13)	.....	.....	.....	.....
Toa Oil Co., Kawasaki	50,000	.....	.....	5,000 Pf	.....
Total Japan	1,096,390	4,500	49,500	78,800	

(1) 30,000-bbl. (Nagoya), 50,000-bbl. (Numazu), and 30,000-bbl. (Sakai) refineries planned. (2) 40,000-bbl. refinery planned for completion 1962. (3) 50,000-bbl. refinery planned for completion 1964. (4) 100,000-bbl. refinery planned for completion 1962. (5) 55,000-bbl. refinery planned. (6) 40,000-bbl. refinery planned for completion 1963. (7) 100,000-bbl. refinery planned for completion 1962. (8) 50,000-bbl. refinery planned. (9) 150,000-bbl. refinery planned. (10) 100,000-bbl. refinery planned for completion 1963. (11) 25,000-bbl. refinery planned for completion 1962. (12) 3,000-bbl. refinery planned for completion 1962. (13) 60,000-bbl. refinery due for completion February 1962.

NEW GUINEA

EXPLORATION on Papua, the Australian side of New Guinea, may get a new lease on life if Murphy Corp. and Burmah Oil reach an agreement with Oil Search, Ltd., following negotiations which were in progress late in the year. Oil Search, an Australian company, increased its interest in a joint venture to 80% this year while its partners, British Petroleum and Stanvac, reduced their interests to about 10% each. The three companies have spent more than $70,000,000 in 25 years without finding commercial oil. If Murphy and Burmah Oil join the play, they reportedly will concentrate on a search for gas.

Crude production on the Dutch side of the island slid further this year to 2,500 bbl. daily from a peak of 13,500 bbl. daily reached 5 years ago. Output is from three disappointing fields which were found in a $110,000,000 exploration and development program carried out by Stanvac, Shell, and Caltex.

NETHERLANDS NEW GUINEA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Klamono, 1936	300	....	27	2,935	20,829,000	18.8
Mogol, 1940	1,250	....	10	116	4,352,000	42.1
Wasian, 1940	2,900-3,225	1	5	166	1,723,000	41.9
Total		1	42	3,217	26,904,000	

PAKISTAN

PAKISTAN this year became one of the free-world nations accepting Russian aid for a government-run exploration program. The soviets will supply about $35,000,000 worth of equipment and expert services over the next 5 years. The first team of soviet technicians arrived, but no drilling is expected until a year after geophysical and geological work starts.

The Russian-supported program will be carried out by Oil & Gas Exploration Corp., one of two new Pakistani companies owned or controlled by the government. The other company, Pakistan National Oils, plans to start marketing operations in April 1962.

The domestic oil and gas industry is supplying about 30% of the country's oil needs. Gas from Sui field accounts for the greater share of this, with deliveries equivalent to about 9,000 bbl. daily of fuel oil.

Three wildcats were in progress near the end of the year. Stanvac was drilling below 5,000 ft. at Badin, Shell below 3,500 ft. at Kailas Tila, and Pakistan Oilfield was at 12,865 ft. at Tanwin. Tidewater is shifting its emphasis from the Karachi area to Baluchistan, where a drilling program is getting started.

PAKISTAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Balkassar, 1946	8,000	3	....	3,190	13,035,000	21.3-26.0
Dhulian, 1957	8,500	12	....	4,070	14,465,768	36.3-45.1
Joya Mair, 1944	6,890	1	....	250	1,836,292	19.0
Karsal, 1959	11,600	1	....	71	38,804	...
Khaur, 1915	4,000	7	72	34	4,080,011	36.9
Total		24	72	7,615	33,455,875	

*21 wells shut in.

PAKISTAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Attock Oil Co., Ltd., Rawalpindi	6,000	.....	.....	.....	.....
Shell-Burmah-Caltex-Stanvac, Karachi	(1)	.....	.....	.....	.....
Total	6,000	.....	.....	.....	.....

(1) 30,000-bbl. refinery under construction by four-company combine.

PHILIPPINES

THE PHILIPPINES' second refinery went into full operation this year with the opening of Stanvac's 24,000-bbl. plant on Bataan. The processing industry is scheduled for further expansion, with a 20,000-bbl. Shell plant planned at Tabango. Gulf Oil will have 25% interest in a 10,000-bbl. plant, with local interests owning the remaining 75%.

A local company, American Asiatic Oil Corp., plans a shallow drilling program next year in an effort to evaluate a small discovery on the northern tip of Cebu. The company has farmed out half interest in other licenses in the area to Jersey Standard and Mobil.

PHILIPPINES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caltex (Philippines), Inc.	26,000	.....	11,000 FCC	.....	13,000 V, 950 Poly
Gulf-Philippine Investment, Luzon	(1)	.....	.....	.....	.....
Royal Dutch-Shell	(2)	.....	.....	.....	.....
Standard-Vacuum Oil Co., Bataan	24,000	.....	12,000 TCC	3,800 CR	9,000 V, 9,600 CH, 2,000 Poly, 3,400 A
Total	50,000	.....	23,000	3,800	

(1) 10,000-bbl. refinery planned. (2) 20,000-bbl. refinery planned.

SINGAPORE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Shell Refining Co. (Singapore), Ltd.:					
Pulan Bukom	.....	20,000	.....	.....	.....
Maruzen-Toyo	.....	(1)	.....	.....	.....
Total	.....	20,000	.....	.....	

(1) 20,000-bbl. refinery under construction.

MALAYA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Shell Refining Co., Port Dickson	(1)	.....	.....	.....	.....
Standard-Vacuum, Port Dickson	(2)	.....	.....	.....	.....
Total	.....	.....	.....	.....	

(1) 20,000-bbl. refinery planned for completion 1964. (2) 20,000-bbl. refinery under construction.

M. HURE, president of Societe Francaise des Petroles BP, French associate of British Petroleum Co., at ceremonies marking commencement of construction of a new head office in Paris for S.F.BP.

THE UNITED KINGDOM is Europe's biggest gasoline market, and marketing companies are being attracted to it in large numbers. Here's a service station in London attending a youthful customer.

AUSTRIA

A PIPELINE study commission set up by the Austrian Government late this year recommended a 320-mile crude pipeline be built to Vienna from Trieste. The system would initially move 20,000 bbl. daily into Vienna, to be expanded later to 40,000-50,000 bbl. daily. The oil is needed to offset a 15 to 20% rise in demand at a time when domestic output—now leveled off at around 45,000 bbl. daily—is expected to go into terminal decline beginning in about a couple of years.

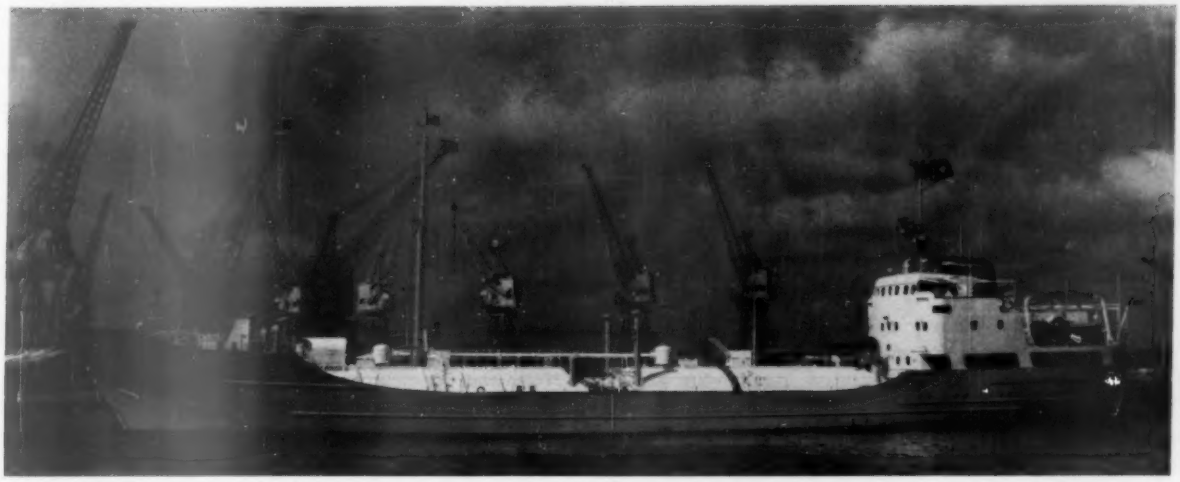
A $42-million government-owned refinery was completed at Schwechat, near Vienna, early this year. The plant processes domestic crude for the account of government, Shell, and Mobil marketing organizations.

Austrian shipments of 20,000 bbl. daily of crude to eastern Europe as war reparations to Russia are scheduled to continue until 1965. Russia is shipping 10,000 bbl. daily of its own high-sulfur crude into Austria, as part of the arrangement.

AUSTRIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Aderklaa, 1939	5,700	7	28	780	13,368,200	43.2
Gaiselberg, 1938	3,940		57	1,771	20,381,645	25.0
Matzen-Auersthal, 1949	4,600	205	349	36,150	164,843,500	23.9
Muehlberg, 1941	4,500	18	67	2,310	30,923,200	31.1
Neusiedl/Zaya, 1939	4,000	....	40	457	9,254,573	31.0
Puchkirchen, 1956	8,470	....	1	84	177,445	34.2
Ried, 1959	4,600	....	13	1,104	651,959	34.4
Steindlberg, 1958	6,260	....	1	42	73,813	35.2
Zisterdorf, 1937	4,760	....	13	316	5,883,912	25.7
Kohleck, 1960	7,350	....	1	138	27,807	30.0
St. Ulrich-Hauskirchen, 1938	4,900	....	187	2,330	33,055,300	31.1
Total		230	757	45,482	278,641,354	

*Another 492 wells shut in.



THE 800-TON LILI THOLSTRUP is the latest and largest vessel being used to transport butadiene by Imperial Chemical Industries' heavy organic chemicals division. The vessel can refrigerate her own cargo.

AUSTRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A.G. der Shell-Floridsdorfer Mineraloelfabrik—Floridsdorf	4,500	.....	.....	.....	.....
Mobil Oil A.G.—Kagran	*3,400	.....	.....	.....	1,300 V, 140 L, 400 A
Oesterreichische Mineraloelverwaltung A.G.:					
Korneuburg	7,100	.....	.....	.....	310 A
Lobau	8,650	.....	.....	.....	.....
Moosbierbaum	6,000	6,000	.....	1,600 T	900V
Schewechat	55,000	5,000 Vis	7,000 Pf	.....	700 V, 800 L, 1,500 A
Richard K. Van Sickle—Neusiedl/Zaya	900	.....	.....	.....	.....
Total	85,550	11,000	7,000	1,600	

*All figures on calendar-day basis.

BELGIUM

TWO AMERICAN companies moved into European markets via the Belgium doorway this year. Sinclair Oil entered a long-term agreement to supply branded products to the Combulic Group, an established distributor. Cities Service acquired an interest in the chemical subsidiary of Evence Coppee, one of Europe's biggest industrial combines.

Two prospecting licenses were issued by the government this year, opening the country to full-scale exploration for the first time. One tract, in northern Belgium, was awarded to a group of seven local coal-mining companies. Petrofina will carry out the work under contract. A Royal Dutch-Shell affiliate obtained a license over acreage in the south.

BELGIUM REFINING

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Albatros, S.A. Belge pour le Raffinage de Petrole, Antwerp-Kiel	14,000	.....	4,500 HD	.....	6,000 V, 700 Poly
Belgium Shell Co., S.A., Ghent	3,000	.....	.....	.....	530 L
Esso Belgium, Antwerp	47,000	.....	10,500 FCC	5,000 Pwr 3,000 T	7,600 V, 6,000 Hyd, 3,900 A
Raffinerie Belge de Petroles, S.A., Antwerp	30,000	.....	.....	2,500 SB 2,400 T	6,000 A, 10,000 H
Ste. Industrielle Belge des Petroles, Kruisschans-Anvers	190,000	.....	13,500 FCC	8,000 T 10,000 Pf	30,000 V, 10,000 H, 1,020 Poly
Tankage & Transport, S.A., Antwerp-Kiel	3,000	.....	.....	700 Pf	.....
Total	187,000	.....	28,500	31,600	

(1) Adding 100,000-bbl. crude unit plus 11,500-bbl. Platformer and 10,000-bbl. hydrogenation unit for 1962 completion.

FRANCE

GAINS IN CRUDE and natural-gas production in French-controlled areas that far outstrip a rise in demand continue to be a major boon to the French economy.

Despite a setback caused by a temporary closing of the pipeline from Edjele oil field in Algeria during the Bizerte crisis, over-all Franc Zone production approached the 400,000-bbl.-daily level this year. Of this, a little over 40,000 bbl. daily is in France itself, about 16,000 bbl. daily in the Gabon and Middle Congo areas of West Africa, and the balance from Algeria.

Most of this crude is being delivered to French refineries, accounting for more than 30% of throughput, while the balance is exported outside the zone. Gas deliveries to commercial users are well over 300 M.M.c.f. daily, with most of the supply coming from Lacq field located in southwestern part of the country.

A 419-mile 30-in. crude pipeline from Marseille to Strasbourg, France, will open by 1963. Extensions of the system will carry crude on to Karlsruhe, West Germany, and then into Bavaria. Nineteen companies are participating in the project. Ste. de la Raffinerie de Strasbourg, in which British Petroleum has one-third interest, plans to open a 66,000-bbl. plant at Strasbourg early in 1963. A Shell affiliate plans another refinery in the area.

A group of government-controlled oil-producing companies hopes to build two 30,000-bbl.-class refineries, both to open in 1964. One would be near Lyon, in Southeast France, and would take supplies from the Marseille pipeline. The other would be at Montereau, and operate on crude produced in the prolific Paris basin.

FRANCE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Bollwiller, 1958	6,000	1	...	...	3,700	36
Brie-Chartrettes, 1959	5,700	7	8	620	334,500	35
Cazaux, 1959	8,200	4	10	3,280	1,432,900	32
Chailly, 1958	5,700	18	12	1,930	1,150,400	35
Chateaurenard, 1958	2,000	...	14	540	370,700	27
Clermont, 1957	7,500	...	...	...	3,200	
Coulommes, 1958	6,100	10	20	2,550	2,899,900	33
Donau-Soufflenheim, 1954	1,600	...	12	...	234,800	30
Eschau, 1956	2,900	...	6	150	202,300	34
Gallician, 1951	...	...	...	...	...	
Lacq, 1949	2,000	15	20	1,660	14,202,800	22
Lucats, 1956	2,100	...	1	80	77,600	38
Lugos, 1956	1,500	...	6	470	900,800	21
Mothes, 1955	2,400	2	1	1,200	1,725,200	21
Parentis, 1954	2,200	10	12	22,780	50,016,200	33
Pechelbronn, 1813	2,000	4	279	420	22,986,700	27
Reiningue, 1955	4,600	...	2	15	109,400	34
Scheibenhard, 1956	3,000	...	15	380	837,400	32
Schirrheim, 1954	1,800	...	3	70	47,400	29
Staffelfelden, 1952	6,100	...	2	15	412,900	40
St. Martin de Bossenay, 1959	9,900	1	9	2,970	1,633,300	32
Villemer, 1959	5,100	3	4	620	370,600	30
Oberseebach, 1960	3,300	...	15	380	837,400	32
St. Firmin, 1960	2,000	...	14	460	104,100	27
Valence Brie, 1960	...	2	1	100	27,000	32
Mimizan Nord, 1960	4,600	...	1	170	79,100	11
Le Pilat, 1960	11,700	...	1	30	5,600	32
Total		77	468	40,890	101,005,900	

FRANCE REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Antar Petroles de l'Antique, Donges	80,000	...	12,000	12,000 CR	400 L
Union Industrielle des Petrole, Gironde	26,000	...	6,000 FCC	4,200 T	10,600 V, 600 Poly
Cie. Francaise de Raffinage:					
Gonfreville	150,000	...	19,000 FCC	19,000 T	2,150 Poly, 2,500 L
La Mede	136,000	2,000	11,600 FCC	20,000 Pwr 19,000 T	1,200 Un, 12,500 CH, 1,000 Poly
Cie. Raffinage Shell-Berre:					
Berre l'Etang	80,000	4,700 Vis	12,000 FCC	11,000 T	...
Pauillac	16,500	...	...	...	...
Petit Couronne	90,000	...	12,500 FCC	8,500 T 13,000 CR	...
C.F.P.-C.F.R.-Pechelbronn—Antar, Strasburg	(2)	...	...	...	...
Esso Standard, S.A.:					
Port Jerome	77,000	6,400 Vis	20,000 FCC	3,500 T 11,900 Pwr	30,000 V, 10,800 Hyd, 3,700 L, 4,200 A

FRANCE REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Bordeaux	45,000	.....	.....	7,200 Pwr	30,000 V, 2,400 A
Mobil Oil Francaise:					
Gravenchon	22,550	.....	.....	3,120 T	5,000 CH, 2,300 L
Frontignan	35,465	.....	10,800 TCC	4,000 CR	.....
Omnium Francaise de Petroles, Chalon	(3)	.....	.....	.....	.....
Pechelbronn, S.A., Merkwiller	4,200	900	.....	.....	.....
Royal Dutch-Shell, Strasbourg	(4)	.....	.....	.....	.....
Ste. Francaise des Petroles BP:					
Dunkirk	67,000	.....	.....	10,000 Pf	13,000 V, 2,000 L, 2,000 A
Lavera	[5]85,000	.....	.....	5,000 T 7,000 Pf	3,500 H
Total	914,715	14,000	103,900	158,420	

(1) Adding 15,000-bbl. Powerformer, 22,000-bbl. catalytic hydrodesulfurization unit for 1963 completion. (2) 60,000-bbl. refinery planned. (3) 60,000-bbl. refinery planned. (4) 70,000-bbl. refinery under construction. (5) Adding 2,000-bbl. asphalt plant.

GREECE

A FRENCH COMPANY, RAP, had a rig operating in Greece this year in the wake of a spate of earlier concession awards. The country's only refinery, near Athens, is operated by Mobil.

GREECE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Oil Transport Trading & Refining Co., Aspropyrgos	30,000	.....	.....	8,200 Cat	500 A
Total	30,000	.....	.....	8,200	

ITALY

ITALY'S ENRICO MATTEI, head of the state oil agency, ENI, continues to be a thorn in the side of private oil industry, both for his ideas and for the tactics with which he seeks to carry them out.

Mattei eventually wants to eliminate private industry as "middle man" between oil-producing and consuming countries. He believes his agency, as an arm of a government, is taking the first steps in this direction with its exploration agreements with foreign governments. These, under which ENI for the most part would receive the small half of a 25-75 profit split, have been made with Iran, Libya, Morocco, Somalia, Sudan, Tunisia, and Egypt. ENI also is expanding its marketing network in Africa and in Europe, where its latest move is entry into the United Kingdom. A pipeline under construction northward from Genoa will supply a Swiss refinery at Aigle. A branch of the system is planned to Bavaria.

ENI also is the largest importer of Russian crude in Europe. These cheap supplies, combined with a protected income from the agency's natural-gas monopoly in the Po Valley, make ENI an important factor in a marketing struggle waging in Italy. The retail price of gasoline at the pump, less taxes, was down to 15.9 cents per gallon this year, the lowest in Europe.

ANIC, a member of the ENI group, has started liquidation proceedings which will break up Stanic, a jointly owned company with Jersey Standard which operates a 49,000-bbl. refinery at Bari and a 47,000-bbl. plant at Leghorn. ENI and Jersey also have filed suits against each other arising out of alleged malfunction of downstream process units and out of the move to split up Stanic.

The petroleum industry is expanding rapidly. Construction has started on a complex at Lucania, on the heel of the Italian boot, that will be based on new gas supplies found by ENI Ceramica Pozzi, of Milan, and Montecatini are participating in the program. Gulf Oil also is going into petrochemicals. A new affiliate is building a phenol-acetone plant on Sardinia.

Petrosud, which Gulf Oil withdrew from 3 years ago, has opened a small gas field near the Adriatic coast of Central Italy. A small-diameter pipeline moves 2,400 M.c.f.d. to Teramo.

ITALY (SICILY) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells*: Flowing	No. of wells*: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Alanno, 1956	2,000	2	8	176	923,000	20-25
Cortemaggiore Busseto, 1949	5,000-6,500	10	12	887	4,303,595	43
Gela (Sicily)	10,000-11,500	15	10	5,020	7,575,091	7-10
Ponte Dirillo (Sicily), 1959	10,000	2	....	398	193,637	14
Ragusa (Sicily), 1954	6,255	....	34	24,368	38,230,876	19.5

ITALY (SICILY) PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Cammarata (Sicily), 1959	10,000-11,000	....	2	62	17,188	8
Lanciano (Sicily), 1961	6,500-7,000	....	1	60	7,351	10-11
Total		29	67	30,961	51,250,738	

*Total of 83 wells shut-in.

ITALY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
AGIP Mineraria SPA:					
Cortemaggiore	3,000	.....	2,000 TCC	.....	.....
Gela (Sicily)	12,500	.....	.....	.....	.....
Anonima Petroli Italiani (API), Falconara	[2]45,000	6,500 Vis	.....	3,000 Pf 4,000 T	4,800 Un, 5,000 A
Aquila Societa Technico-Industriale, Trieste	33,000	.....	5,000 TCC	3,000 T 5,000 Pf	4,500 V, 5,000 Un, 5,000 TR, 1,400 Poly, 750 L, 2,000 A
Condor SPA per l'Industria Petrolifera y Chimica, Rho	[3]40,000	.....	15,000 TCC	6,700 Pf	6,000 CH, 400 Poly
Dellepiane, Genoa	1,750	.....	.....	400 T	200 Alky
Distilleria Italiana Catrami (DICA), Carrara	9,200	500	.....	.....	.....
Esso Standard Italiana, Trieste	7,300	.....	.....	1,000 Pf	1,300 V, 800 A
Garrone, Genoa	35,000	.....	.....	5,600 Pwr	5,000 Hyd, 300 L 450 A
Getty Oil Italiana, Gaeta	40,000	.....	.....	3,000 Pf	.....
Industria Chimica Italiana del Petroleo (ICIP), Mantova	20,000	5,400	.....	2,500 Pf	.....
ILSEA, Como	2,700	300	.....	500 Cat	.....
IPLOM, Genoa	10,000	.....	.....	2,000 Pf	.....
Industria Raffinaria Oli Minerali (IROM), Porta Marghera (Venice)	41,000	.....	.....	6,000 Pf 7,600 T	7,000 V, 6,500 BPH, 1,600 Poly, 450 A
Italia Raffineria Olii Minerali SPA, Cremona	29,000	.....	.....	3,500 T 650 T	400 Poly
Lombarda Petroli, Milan	5,200	.....	.....	7,500 T	2,900 V, 11,000 CH,
Mobil Oil Italiana, Naples	113,700	.....	15,000 TCC	11,000 CR	1,000 Poly, 400 L, 500 A
Petroli d'Itali Fiorenzoula d'Arda	5,000	2,000	.....	720 T	.....
Purfina Italiana, SPA:					
Genoa	11,000	.....	1,800 TCC	1,500 Pf	1,100 A
Milan	4,500	.....	.....	.....	3,000 V, 500 L, 1,000 A
Rome	[4]11,000	.....	1,800 TCC	720 CR 900 CR	1,250 A, 380 L
Raffinaria NILO Spa, Milan	7,000	.....	.....	.....	.....
Raffineria Oli Lubricanti (ROL), Viguzzolo	1,400	.....	.....	.....	380 L
Raffineria Siciliana Oli Minerali (RASIOM), Augusta	130,000	10,000 Vis	.....	8,000 T 8,000 Pwr	5,000 V, 1,700 Poly, 8,000 Hyd, 5,000 A
Raffineria Volpato, Milan	2,100	.....	.....	.....	.....
San Quirico, Genoa	4,500	.....	.....	.....	.....
S.I.R.O.M., Milan	1,500	.....	.....	.....	.....
S.A.R.O.M., Ravenna	60,000	.....	.....	4,000 HF 5,500 T 10,000 SB	14,000 Un
Sta. per Azioni Raffineria Padana Oli Minerali (SARPOM), Novara	[5]21,000	.....	5,500 FCC	4,200 T	10,000 V, 350 Poly
Sta. per l'Industria del Petroleo (INPET), La Spezia	40,000	.....	.....	3,000 T	.....
Sta. Petrolifera Intaliana, Fornova Taro	3,000	.....	.....	1,500 CR	.....
Stanic Industria Petrolifera:					
Bari	48,780	.....	.....	7,300 Pwr	7,220 Hyd, 5,500 A
Leghorn (Livorno)	47,000	.....	.....	3,800 T 8,900 Fhy	7,960 Hyd, 2,200 L, 6,000 A
S.T.O.I., Florence	15,000	.....	.....	7,300 Pwr	7,220 Hyd
Total	851,130	24,700	46,100	148,290	

(1) 60,000-bbl. refinery as part of petrochemical complex under construction. (2) Adding 5,000-bbl. atmospheric distillation unit, 6,500-bbl. visbreaker and 3,000-bbl. Platformer. (3) Modification to add 4,000 bbl. crude capacity. (4) Plan new 30,000-bbl. refinery. (5) Adding 6,000 bbl. crude capacity.

NETHERLANDS

NETHERLANDS' big refining industry is fast swinging into the petroleum side of the business. Among the important current projects is a 220,000-ton-capacity per year plant to be built by Esso which will be the largest of its kind in Europe for the production of benzene, toluene, xylenes, and related products. It is expected to go into operation in mid-1963. Amoco International, a subsidiary of Indiana Standard, has

joined with a Dutch partner for the production of dimethyl terephthalate at Delfzijl. Imperial Chemical Industries will build a $280-million petrochemical complex near Rotterdam over the next decade. Shell will start producing a new group of synthetic organic acids on a commercial basis in January 1962. These will be marketed under the trade name "Versatic."

A joint Jersey Standard-Royal Dutch Shell exploration company is trying its luck in the first offshore drilling program ever carried on in the North Sea. The first test, 2½ miles off the coast near Kijkduin, was completed at 6,000 ft. as a disappointing well late this year. A second well will be drilled from the same site when the weather clears in spring. A mobile platform is being used. The company, NAM, is looking for productive horizons found in onshore fields near the coast. Late last year, the company brought in a major gas discovery at Slochteren.

NETHERLANDS PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Alblasserdam, 1957	4,800	....	1	2	23,000	25.2
Andel, 1953	3,100-4,800	....	....	.....	6,000	12.7-31.7
Berkel, 1954	3,100-3,700	....	3	49	166,000	36.3
Delft, 1954	3,100-3,800	2	1	10	109,000	31.9-32.5
De Lier, 1955	5,200	1	21	1,690	2,450,000	34.5
Ijsselmonde—Ridderkerk, 1956	3,100-5,000	35	9	11,591	8,027,000	19.8-26.6
Lekkerkeek, 1960	....	....	....	.....	5,000	19.7
Moerkapelle, 1957	2,400-4,400	....	3	54	96,000	14.1-29.3
Meijendel, 1958	4,200	....	1	5	45,000	18.2
Pijnacker, 1955	5,800	3	3	874	2,218,000	36.3
Rijswijk, 1953	2,500-5,100	....	6	443	2,457,000	23.5-32.3
Schoonebeek, 1943	2,500	....	300	16,948	83,597,000	25.0
Wassenaar, 1956	4,200	10	11	5,645	5,498,000	18.4
Werkendam, 1958	6,500	....	1	26	32,000	33.0
Zoetermeer, 1957	3,200	....	7	945	1,136,000	16.5
Total		51	367	38,282	105,865,000	

*Includes artificial lift.

NETHERLANDS REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caltex Pet. Maatschappij (Nederland), N.V., Pernis	63,000	8,000	8,500 Pf	7,000 T	7,000 Un., 950 Poly
Esso Nederland, Rotterdam	100,000	.....	.....	16,500 Pwr	16,500 Hyd
Gulf Oil Corp., Rotterdam (2)	.....	.....	.....	.....	.....
N.V. de Bataafsche Petroleum Mij, Pernis.	1300,000	20,000	77,000 FCC	12,700 Pf 10,000 T	24,000 H
Total	463,000	28,000	85,500	46,200	

(1) 6,700-bbl. Platformer and 15,000-bbl. hydrodesulfurization unit under construction. Due completion January 1962.
(2) Will build a 30,000-bbl. refinery.

SPAIN & PORTUGAL

CONSTRUCTION will start soon on a 25,000-bbl. refinery to be built on the north coast of Spain by Ohio Oil and Spanish associates. Ohio Oil, which will use the plant as an outlet for some of its Libyan crude, will put up 84% of the cost of the plant. It will retain 28% ownership, while its Spanish partners will hold 16%. The government will own 52%, and Cia. Iberica de Petroleos, a local holding company, 4%.

In another project, the Spanish Government has approved a refining and petrochemical complex to be

SPAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Espanola de Petroleos, S.A., Santa Cruz de Tenerife, Canary Islands	106,000	3,500 Vis	.....	2,500 T 20,000 Pf	10,000 V, 15,000 Un, 590 L, 6,700 A
Calvo Sotelo, Puertollano	(1)	.....	.....	.....	.....
Refineria de Petroleos de Escombreras, S.A., Escombreras	86,500	.....	.....	9,000 T 11,000 Pf	2,500 V, 250 Poly, 550 L
Ohio Oil Co.	(2)	.....	.....	.....	.....
Total	192,500	3,500	....	42,500	

(1) 30,000-bbl. refinery planned as part of petrochemical complex. (2) 25,000-bbl. refinery planned in northern Spain.

PORTUGAL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Sacor, S.A., Lisbon, Cabo Ruivo	29,000		11,000 TCC		1,400 Poly, 600 L
Oporto	(1)				
Golden Eagle Refining Co., Cape Verde Islands	(2)				
Total	29,000		11,000		

(1) Plan new 20,000-bbl. refinery. (2) 15,000-bbl. refinery planned.

built at Puertollano, in South Central Spain by Calvo Sotelo, a subsidiary of the state-owned INI. Crude supplies will be delivered to the facilities via a 177-mile pipeline.

Despite a lack of commercial discoveries, Spain continues to be actively explored. Gulf Oil and a Spanish partner, Ciepsa, acquired further acreage in Valencia, where Pan American also recently joined the search. Eurafrep, a private French company, has joined a program being carried out by German and Spanish interests.

In Portugal, Sacor plans to expand its existing refinery near Lisbon, and to build a new 20,000-bbl. plant at Oporto. The government awarded a refining concession in the Cape Verde Islands to Golden Eagle Refining Co., a subsidiary of Ultramar Co. Details for a 15,000-bbl. plant were being negotiated late in the year.

SWITZERLAND

Ste. Des Raffineries du Rhone is building a 40,000-bbl. refinery at Collombey-Le-Grand. Completion is due in late 1962 or early 1963.

Switzerland's second refinery, to be built at Aigle, will be supplied by a pipeline now under construction northward from Genoa. Italy's ENI will have the right to transport all crude to the plant, and have use of one-third of its capacity. Switzerland also will be a transit country for the planned branch of the Aigle pipeline into Bavaria.

RUSSIA AND SATELLITES

RUSSIA is now firmly established as the world's second-biggest oil producer, and is bent on catching up with and passing U. S. crude output sometime during the decade of the 1970's.

Output this year averaged about 3,316,000 bbl. daily, up 12% over last year. The Communists have expressed confidence that their goal of 4.8 million barrels daily in 1965 will be exceeded. The target for 1970 is 7.8 million, and for 1980, about 14 million barrels daily.

About 450,000 bbl. daily of this year's output was shipped to free-world countries as crude and products. It accounted for about one-fifth of Russia's foreign exchange earnings, and it served as an important barter commodity with which the country acquired steel pipe, pumping equipment, and other oil industry items in short supply in the USSR.

The western industry is concerned less with the volume of soviet export than with cut rate prices. With these often set for political, as well as economic reasons, soviet oil is exerting a heavy downward pressure on prices in a period when supplies are already in surplus.

Another facet of soviet encroachment into free-world oil countries is its technical and financial-aid programs to government-controlled companies. Russian crews are drilling in India, Egypt, and Syria under government auspices, and Russian-run surface work is starting in Pakistan. Russia also is financing and supplying equipment for a number of refinery projects in India and Egypt.

"Second Baku" between the Volga River and the Ural Mountains is the source of most new Russian production. But Baku itself, on the west coast of the Caspian Sea, continues to be the second most important oil region.

Gas production is making big gains, but not enough to keep pace with goals set by the soviets. Deliveries are lagging, despite a rise in production this year to 5.75 billion cubic feet daily.

Tremendous new gas reserves will be tapped when a 4,000 to 5,000-mile transmission network from "Third Baku" is completed. The area, lying between the Caspian Sea and extreme western China, has Russia's largest gas reserves. Outlets to centers in Southwest Russian Asia are either completed or under construction. The biggest outlet will be planned parallel 40-in. lines running northward to industrial regions in the Urals.

Crude pipeline systems also are getting priority, and two of these eventually will link Second Baku with the Pacific Ocean on the east, and the Baltic Sea on the west. The far eastern line would be an extension of the completed, or nearly completed, Trans-Siberian line to Irkutsk. The Russians are now dickering with Japanese industrialists for steel pipe with which to build an extension to Vladivostok. The pipe would be paid for with oil.

On the west, a branch of the Friendship line (formerly the Comecon system), is scheduled to be built to the Baltic. This would give Russia a shorter transportation route to northern Europe, where it already sells more than 80,000 bbl. daily of crude and products in Scandinavia.

Satellites. A 435-mile section of the Friendship line has been completed in Russia and Czechoslovakia, and will start moving crude to a new Czech refinery early

in 1962. Rail shipments temporarily will fill a gap in an incomplete portion of the system in Russia.

The 3,105-mile system is expected to be moving 300,000 bbl. daily to Czechoslovakia, Hungary, Poland, and East Germany by 1965. Crude output is relatively small in three of the countries, and in East Germany is nonexistent. An East German find this year, however, has possible commercial prospects.

Romanian output remains relatively stable at about 234,000 bbl. daily. There is little hope for any substantial gain.

Red China. Few details are being disclosed about Communist China's oil industry. The country is actively developing fields in its far northwest. But it also is relying heavily on development of oil from shale and coal, which is widely scattered throughout the country, in many cases much closer to centers of consumption.

SCANDINAVIA

SCANDINAVIA continues to be one of Europe's healthiest markets with combined consumption in Norway, Sweden, Denmark, and Finland of about one-half-million barrels daily. Tidewater this year opened a 20,000-bbl. refinery at Kalundborg, Denmark, and as part of an expansion program is building service stations in Denmark and Norway. Gulf Oil plans to open its new 30,000-bbl. plant at Stigsnaes, Denmark, by the end of 1962. The Finnish Government is doubling the size of its 28,000-bbl. plant near Turku, on the Baltic Sea. Finland also is one of the best markets for Russian oil, which supplies about 87% of demand. This compares with about a 15% in Sweden, 8% in Norway, and 2% in Denmark.

SCANDINAVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Finland Refining					
Neste Oy Corp., Naantali	[1]28,000	.....	13,500 TCC	3,400 Cat	14,000 V, 500 Poly, 4,500 A
Total	28,000	.....	13,500	3,400	
Sweden Refining					
A. B. Nynas-Petroleum:					
Nynasham	20,000	.....	.....	1,900 T 6,800 Pf	4,500 V
Malmo	1,900	.....	.....	.....	1,500 V
Gothenburg	3,000	.....	.....	.....	2,400 V
Kopportranz Oljeaktiebolag Sharvik	40,000	.....	.....	8,000 Pf 4,400 T	9,500 CH
Total	64,900	.....	.....	21,100	
Denmark Refining					
A/S Dansk Mineralolie-Fabrik-Copenhagen	.....	.....	.....	.....	60 L
A/S Kalundberg Olieraffinaderi-Kalundberg	.....	.....	.....	.....	900 V, 700 A
Dansk Veedol-Kalundberg	20,000	.....	.....	4,000 Pf	14,400 V, 4,800 H, 9,000 CH
Gulf Oil-Stigsnaes	(1)	.....	.....	.....	.....
Total	20,000	.....	.....	4,000	
Norway Refining					
A/S Esso-Raffineriet, Norge-Slagenslagen a Naess	42,000	.....	.....	6,000 Pwr	.....
Norske Esso A/S-Valloy Pr. Tonsberg	2,360	.....	.....	.....	1,450 V, 550 L, 780 A
Total	44,360	.....	.....	6,000	

(1) Adding 28,000-bbl. crude unit, 3,400-bbl. Calformer, and 6,000-bbl. Shell trickle hydrogenation unit.

(1) 30,000-bbl. refinery under construction.

UNITED KINGDOM

A STEP of far-reaching industry consequences was taken late this year when the British Government approved commercial imports of liquefied methane as a supplement to its town-gas supplies.

The project, which opens overseas marketing vistas to the world's big gas fields, will bring natural gas from Algeria into England at the rate of 100 M.M.c.f.d. by 1965. This will replace 800,000 tons of coal and 400,000 tons of oil a year, and be equal to 10% of its present gas supply.

The gas will be imported by two tankers of about 26,000 tons, each capable of carrying 11,000 tons of liquefied gas, or about 575 M.M.c.f. The gas will flow into a specially equipped terminal on Canvey

Island, from where it will be delivered to 7 of the country's 12 area gas boards. The tankers will be built and chartered by British Methane, Ltd., jointly owned by Conch International and the British Gas Council. Conch is owned jointly by Continental Oil, Union Stockyards, and Shell.

The United Kingdom is Europe's biggest gasoline market, and marketing companies are being attracted to it almost in droves. Italy's ENI is the latest entry, with plans for a nation-wide service-station network early in its operations. Continental Oil this year acquired Jet Petroleum, a large independent chain. Cie. Francaise des Petroles, which opened its first British station a year ago, is dotting London, Manchester, and other areas with its "Total" trademark. Murphy Corp. plans to start marketing in the country next year. Tidewater has started lubricating oil under its "Veedol" trade name, a move which may be a step toward gasoline marketing.

British Petroleum raised the country's modest crude production to over 2,000 bbl. daily the first half. Esso moved into the exploration picture by taking out prospecting licenses over 1.3 million acres in southeastern England.

UNITED KINGDOM PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Bothamsall, 1958	3,360	....	13	371	274,000	40.4
Caunton, 1943	2,200	....	9	9	259,000	28.2
Corringham, 1958	4,660	....	3	130	70,000	39.1
Duke's Wood, 1941	1,960	....	101	322	4,004,000	32.8
Eakring, 1939	1,970	12	19	59	2,041,000	32.8
Egmanton, 1955	3,250	....	36	552	1,132,000	39.8
Formby, 1939	140	....	9	1	73,000	34.5
Gainsborough, 1959	4,600	....	6	148	67,000	38.3
Glentworth, 1961	3,570	....	1	....	....	37.7
Kelham Hills, 1941	2,100	6	34	142	1,953,000	28.2
Kimmeridge, 1959	1,720	1	....	163	48,000	44.2
Langar*, 1958	....	....	....	....	600	....
Plungar, 1953	3,000	....	9	61	172,000	32.8
South Leverton, 1960	4,175	....	2	110	24,000	....
Total		19	242	2,068	10,117,600	

*Abandoned.

UNITED KINGDOM REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
England					
Berry Wiggins & Co., Ltd.:					
Kingsnorth on Medway, Kent	[1]2,320	....	....	....	250 L, 1,800 A
Weaste	[2]1,500	....	....	....	1,660 V, 1,600 A
BP Refinery (Kent), Ltd., Isle of Grain	[3]210,000	....	16,500 FCC	20,500 Pf 12,000 T	50,000 V, 4,000 L, 20,000 BPH
Esso Petroleum Co., Ltd., Fawley	244,400	....	49,000 FCC	21,000 Pwr 15,000 FHy 6,000 T	2,270 A, 73,100 V, 29,500 Hyd, 4,000 Poly, 4,240 L
Lobitos Oil Fields, Ltd., Ellesmere Port	[4]4,200	800	....	800 Pf	1,100 V, 650 L, 150 A
Manchester Oil Refg., Ltd., Manchester	3,500	....	....	....	3,000 V, 3,000 L
Mobil Oil Co., Ltd., Coryton	[4]42,000	....	10,500 TCC	6,000 CR	21,000 V, 3,300 L
Shell Refg. & Marketing Co., Ltd.:					
Heysham	36,000	6,000 Vis	....	4,000 T	....
Androssan	3,200	....	....	....	....
Shell Haven	[5]160,000	....	....	13,000 T	16,000 CH
Stanlow	[6]105,000	....	35,000 FCC	13,000 T 10,000 Pf	....
Total England	812,120	6,800	111,000	121,300	
Scotland					
Grangemouth Petroleum Ref., Grangemouth	75,000	....	12,500 FCC	....	24,000 V, 2,200 Poly, 500 CH
Scottish Oils, Ltd., Pumperston	3,500	1,500	....	....	15 C[7]
Total Scotland	78,500	1,500	12,500	....	
Wales					
BP Refinery (Llandarcy), Ltd., Llandarcy	[9]74,000	....	15,000 FCC	6,000 Pf	26,000 V, 3,500 Auto, 2,000 L, 500 A
Esso Petroleum Co., Ltd., Milford Haven	100,000	....	....	16,500 Pwr	....
Total Wales	174,000	....	15,000	22,500	
Total United Kingdom	1,064,620	8,300	138,500	143,800	

(1) Adding 4,000-bbl. vacuum unit and 2,500-bbl. asphalt plant. (2) Adding 500-bbl. crude unit and 250-bbl. asphalt plant. (3) Adding 25,000-bbl. vacuum unit, 15,000-bbl. Platformer, plus 6,000-bbl. lube ferrofining unit. (4) Adding 15,000-bbl. crude capacity. (5) 3,800-bbl. isopentane unit planned. (6) 6,700-bbl. Platformer planned. (7) Tons per day. (8) Expanding crude capacity 5,000 bbl. daily, plus new 2,500-bbl. vacuum unit, 300-bbl. asphalt plant. (9) Adding 3,500-bbl. lube ferrofining unit.

IRELAND

IRELAND'S first wildcat will probably be drilled early in 1962 by a group of three American independents, Continental Oil, Ohio Oil, and Ambassador Oil. Ambassador holds concession covering entire republic.

IRELAND REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Irish Refining Co., Ltd., Whitegate	42,000			9,000 Pwr	5,400 Hyd.
B.P. Refinery (Northern Ireland) Co., Ltd., Belfast	(1)				
Total	42,000			9,000	

(1) 30,000-bbl. refinery planned for completion in 1964.

WEST GERMANY

MOST of West Germany's refining capacity is now supplied by crude pipelines from Rotterdam and Wilhelmshaven, both of which terminate in the Ruhr, and plans are now set for delivering crude deep into Bavaria by 1964.

The 186-mile 22 to 24-in. Bavarian line to the Ingolstadt area will be an extension of the big-inch Marseille-Karlsruhe system. It will be completed by the end of 1963 with an initial capacity of 160,000 bbl. daily. This can be expanded later to 300,000 bbl. daily. Nine private companies have an interest in the project which will supply three proposed refineries. These are a 70,000-bbl. plant planned by Esso, a 40,000-bbl. Deutsch Shell plant, and a 40,000-bbl. Gelsenberg-Benzin plant.

Plans for the line have been speeded by a competitive line being built by Italy's ENI. A branch of this system under construction to Switzerland will extend into Bavaria, where an ENI affiliate, Suedpetrol, plans a 40,000-bbl. plant.

American companies expanding operations in the country include Caltex, which is building a 40,000-bbl.-daily refinery at Frankfurt, and Continental Oil, which is joining Deutsche Erdol in a petrochemical development near Hamburg. Ohio Oil will have 40% interest in a 40,000-bbl. refinery near Mannheim to be built jointly with Wintershall.

Domestic crude production from more than 100 small fields rose to over 125,000 bbl. daily late in October, making the country's output nearly triple that of any other nation in western Europe. The country's natural-gas business also is growing.

SECTION OF BRITISH PETROLEUM'S RUHR REFINERY showing power station, distillation units, Platformer, and Hydrofiner units and part of tank farm in background.

WEST GERMANY PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bavaria					
Oedgassen, 1959	7,200	.....	.....	1,463	...
Albaching, 1958	8,200	.....	.....	5,352	...
Ampfing, 1954	4,600	21	1,243	1,965,891	20
Heimertingen, 1954	5,100	4	39	173,524	33-37
Hohenlinden, 1959	4,250-7,200	.....	.....	3,728	...
Isen, 1954	6,550-6,600	.....	2	10,316	18
Lauben, 1959	4,750	3	50	63,850	37
Moenchsrot, 1958	4,800-4,850	13	1,111	850,807	36
Moosach, 1959	9,650-9,700	.....	.....	24,261	...
Tegernsee, 1883	.....	.....	.....	32,369	...
Velden, 1960	4,600-4,950	5	232	64,454	25
Markdorf, 1960	7,700	1	7	1,796	37
Wolfersberg, 1960	.....	.....	60	11,254	56
Total Bavaria		47	2,744	3,209,065	
Emsland					
Adorf, 1948	4,150	6	362	152,316	30
Emlichheim, 1944	2,600	113	2,603	13,610,764	25
Frenswegen, 1958	1,300	.....	.....	270	...
Georgsdorf, 1944	1,800-2,600	235	7,524	22,264,691	24-29
Hebelermeer, 1955	3,950	9	626	471,106	29-30
Lingen, 1942	2,950-3,300	236	1,550	10,694,609	30-32
Meppen, 1960	3,800-4,050	6	200	57,198	28-30
Ruhlermoor, 1949	2,000-4,000	242	9,007	24,509,555	25
Ruhlertwist, 1949	2,350-2,900	141	3,197	10,440,067	25
Scheerhorn, 1949	3,550-3,750	108	3,942	8,558,482	30
Total Emsland		1,096	29,011	90,759,058	
Hamburg					
Grob-Hamburg, 1960	6,725-7,150	4	270	60,769	29
Hohenhorn, 1954	7,900	.....	.....	2,939	...
Reitbrook, 1937	1,450-2,100	109	2,101	13,004,033	29
Total Hamburg		113	2,371	13,067,741	
Hanover					
Broistedt, 1937	2,450	7	100	611,807	35
Calberlah, 1945	200	.....	.....	62,217	22
Eddesse, 1896	800-2,950	64	593	4,287,001	26-34
Eicklingen, 1937	1,800	14	144	2,534,487	32-33
Eilte, 1947	3,700-5,750	26	1,196	1,673,995	23-35
Eldingen, 1949	4,750	41	1,664	6,837,435	35
Esperke, 1960	4,250-4,400	1	6	6,525	35
Fuhrberg-Hambuehren, 1939	260-1,950	225	482	6,206,046	22-23
Gifhorn, 1935	1,300	10	16	422,983	16
Hademstorf, 1941	4,100	6	50	889,474	25-29
Hankensbuettel, 1954	4,450-5,100	57	7,318	13,890,192	33
Hardesse, 1957	6,050	5	125	83,361	34
Hohenassel, 1943	1,500	27	271	2,635,511	31
Hohne, 1951	4,300-5,900	45	4,429	12,277,647	33-34
Lehrte, 1952	3,750	61	1,410	2,810,208	31
Leiferde, 1956	2,600	35	2,651	3,003,257	34
Lichtenhorst-Rhaet, 1959	3,300-3,400	.....	54	11,332	28
Lueben, 1955	3,950	13	1,175	1,846,014	35-38
Meckelfeld, 1938	1,000-1,300	29	1,568	1,390,201	24-32
Meerdorf, 1954	5,350-6,000	20	269	218,297	42
Moelme, 1935	1,700	14	263	1,414,483	26
Nienhagen, 1899	800-4,100	197	5,053	45,557,462	22-32
Oberg, 1918	500-850	32	100	2,851,843	36-46
Oerrel-Wesendorf-Nord	4,450	42	1,296	2,548,027	...
Rautheim, 1955	330	1	2	7,036	27
Ruehme, 1954	1,950	39	604	1,323,575	...
Sottorf-Ost, 1961	6,800	1	71	12,908	...
Steimbke, 1936	800-4,600	199	1,239	8,750,999	18-34
Stemmerberg, 1948	4,000	.....	.....	66,324	16
Suderbruch, 1949	3,750-7,550	79	2,291	10,970,664	19-38
Thoeren, 1941	1,550-4,000	47	171	2,302,218	31
Vechelde, 1954	5,750	.....	.....	719,013	31
Volkensen, 1960	4,600-4,700	.....	.....	2,386	22
Vorhop, 1952	2,950-6,900	23	1,894	2,698,817	36
Vorhop-Knesebeck, 1958	5,100-5,200	20	1,477	747,900	36
Wesendorf, 1943	1,300-5,900	69	1,108	7,948,904	17-42
Wesendorf-Sud, 1958	4,900	...	64	65,760	...
Wietze, 1879	1,300-4,900	39	359	18,950,028	16-29
Total Hanover		1,484	39,513	168,636,337	

WEST GERMANY PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Schleswig-Holstein					
Boostedt-Ploen, 1952	5,750	39	2,953	9,319,709	29-34
Bramstedt, 1954	6,150	19	1,094	3,653,987	34-35
Heide, 1935	3,450-5,750	61	770	14,754,531	21-32
Kiel, 1955	5,750	14	189	522,723	32
Ploen-Ost	6,400	26	2,494	1,281,188	36
Schwedeneck, 1956	4,900	23	1,033	1,055,465	25
Warnau, 1957	8,200	1	41	48,990	35
Total Schleswig-Holstein		183	8,574	30,636,593	
Upper Rhine Valley					
Beuchenau, 1959	2,250	.....	.....	1,193	...
Deidesheim, 1959	3,850-3,900	1	.....	7,895	...
Dudenhofen, 1952	6,550	3	83	80,564	26-27
Eich, 1959	6,850	1	7	11,807	...
Forst-Weher, 1934	1,000-2,950	.....	.....	681,195	32-34
Graben, 1959	4,750-4,850	2	29	25,894	34
Hayna, 1957	4,500-4,700	1	.....	15,016	39
Hofheim, 1958	8,200	4	47	34,101	...
Huttenheim, 1936	5,250	1	14	32,632	31
Knielingen, 1959	4,800	2	48	43,786	...
Landau, 1955	3,950-4,800	68	2,445	2,934,686	36
Leopoldshafen, 1957	3,100-4,000	14	288	269,658	40
Maximiliansau, 1958	4,250-4,550	1	12	8,314	...
Minfeld, 1956	2,650	11	108	171,188	...
Neureut, 1958	2,800	1	26	47,797	...
Offenbach, 1958	3,350-3,500	6	63	84,845	36
Rheinzabern, 1959	3,700-3,800	.....	.....	2,705	41
Rot, 1953	2,150	7	51	410,053	25-26
Stockstadt, 1952	5,400	26	905	2,955,979	39
Wattenheim, 1954	7,500	3	32	69,878	...
Weingarten, 1936	1,000-3,600	42	37	511,818	31-34
Total Upper Rhine Valley		194	4,195	8,401,004	
Weser-Ems					
Barenburg, 1953	2,300-3,300	41	3,057	5,880,674	29
Bockstedt, 1954	3,750	23	1,705	1,370,754	...
Bramhar-Wettrup, 1958	2,560-3,300	54	5,160	1,872,156	29
Dickel, 1953	3,450	34	398	406,383	26
Diepholz	2,600-2,850	4	95	126,132	...
Dueste, 1954	2,600-4,250	201	5,932	13,448,777	...
Elsfleth, 1956	5,000	13	493	731,130	24-26
Etzel, 1942	4,600	.....	.....	383,379	13
Hemmelte-West, 1951	3,300-4,250	45	1,585	7,389,346	32
Liener-Garen, 1953	2,450-4,250	9	75	332,678	28-31
Loeningen, 1959	3,750-3,800	12	599	206,376	34
Molbergen, 1953	2,350	16	173	669,402	26
Ortland, 1956	1,700-1,850	18	482	842,287	32
Ostenwalde, 1953	4,750-4,900	39	800	1,251,673	...
Oythe, 1956	3,750-3,800	2	11	27,115	28.5
Quakenbrueck, 1950	1,800	3	20	324,910	35
Siedenburg, 1956	2,250	23	666	704,292	25.5
Varel, 1957	5,050-5,150	15	979	669,012	26-29
Vechta, 1955	5,200-6,500	55	2,855	3,076,998	39
Voigtei, 1953	1,150-1,500	106	3,621	6,440,935	31-34
Wehrbleck, 1957	3,400	47	1,756	879,335	...
Total Weser-Ems		760	30,462	47,033,744	
Total West Germany		3,877	116,870	361,743,542	

WEST GERMANY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
B.P. Benzin und Petroleum AG:					
Hamburg-Finkenwerder	51,000	.....	.....	6,000 Pf	7,000 V, 6,500 BPH, 1,200 A
Dinslaken	[1]110,000	.....	.....	10,000 Pf	10,000 BPH
Caltex Oil (Germany) G.m.b.H.	[2]	.....	.....	.....	.....
Deutsche Erdoel-AG:					
Wietze	800	.....	.....	.....	.....
Heide	32,000	.....	11,200	3,400 Pf 3,400 CR	7,800 H, 1,600 L, 320 Poly
Deutsche Shell AG:					
Monheim/Reisholz	6,000	.....	.....	6,400 CR 8,400 Pf	.....

WEST GERMAN REFINING (Continued)
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Godorf	70,000	.....	.....	.....	35,000 CH
Hamburg/Harburg	60,000	.....	11,700	7,400 CR 7,500 Pf	7,500 CH, 420 L, 420 Poly
Erdolwerke Frisia AG-Emden	30,000	.....	4,200	4,200 CR	.....
Esso, AG:					
Hamburg/Harburg	57,000	.....	11,500	6,500 CR	1,500 L, 6,400 Fhy
Cologne	72,000	.....	.....	7,300 Pwr	13,800 Hyd.
Karlsruhe	(3)	.....	.....	.....	.....
Gelsenberg Benzin AG, Gelsenkirchen-Horst	95,000	.....	9,500	26,500 CR	15,300 H, 950 Is, 510 Poly
	(4)				
Gewerkschaft Deurag-Nerag, Misburg	30,000	20,600	2,600	6,400 CR 2,800 Pf	180 Poly
Gewerkschaft Erdoel Raffinerie Emsland, Lingen-Holthausen	53,000	.....	18,200	6,600 CR 4,000 Pf	3,000 HF, 770 Poly, 105 CH
Kleinholz Co., Essen-Altenessen	8,500	.....	.....	.....	.....
Mineraloel and Asphaltwerke AG, Ostermoor on Kiel-Canal	5,300	.....	.....	.....	5,300 A
Mineraloelwerke Albert Sengewald, Dedenhausen	*900	.....	.....	.....	.....
Mineraloelwerke Peine, Peine	400	.....	.....	.....	.....
Mobil Oil AG in Deutschland, Bremen-Olebshausen	32,000	.....	7,400	4,200 CR	.....
Oelwerke Julius Schindler G.m.b.H., Hamburg-Neuhof	5,000	.....	.....	.....	700 V, 1,100 L
Purfina, Duisburg-Neunkamp	21,000	.....	.....	3,200 CR	4,000 PD
Ruhrbau G.m.b.H., Muelheim	6,400	.....	.....	.....	.....
Ruhrchemie AG, Oberhausen/Holten	10,000	.....	4,900	3,200 CR	1,300 H
Ruhroel G.m.b.H., Bottrop-Welheim	*2,600	.....	.....	800 T	.....
Scholven-Chemie AG, Gelsenkirchen-Buer	49,000	.....	5,100	9,100 CR	9,500 H, 180 Poly
Suedpetrol (ENI), Ingolstadt	(5)	.....	.....	.....	.....
Union Rheinische Braunkohlen Kraftstoff AG, Wesseling	64,000	15,900	.....	6,400 T 5,600 CR	9,500 H, 430 Poly
Wintershall AG, Salzbergen	4,600	.....	.....	.....	.....
Zeller & Gmelin, Eislingen/Fils	*170	.....	.....	.....	.....
Total	876,670	36,500	86,300	149,300	

*Not in operation. (1) Building 20,000-bbl. vacuum unit, 10,000-bbl. FCC unit and 2,000-bbl. asphalt plant. (2) 40,000-bbl. refinery under construction. (3) 75,000-bbl. refinery under construction. (4) 40,000-50,000-bbl. refinery planned near Neustadt. (5) 40,000-bbl. refinery planned.

YUGOSLAVIA

YUGOSLAVIA crude production rose to 27,000 bbl. daily the second half of the year, well on its way toward the government's goal of 44,000 bbl. daily by 1965. The local refining industry is already hard-pressed to keep up with crude supply, and construction is expected to start soon on a 24,000-bbl. plant at Pancevo. Italy's ENI late in the year was negotiating to build the plant. The country's other small refineries, with a total capacity of 26,000 bbl. daily, will be expanded as part of the program. The country's small natural-gas pipeline network also is being expanded to make use of new supplies. One project under construction will move gas from Kikinda to Pancevo, where it will supply a fertilizer plant, etc.

YUGOSLAVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Rafinerijanafte Boris Kidric, Rijeka	8,600	.....	.....	.....	800 L
Rafinerijanafte Bosanski, Brod	10,000	2,600	.....	.....	.....
Rafinerijanafte Sisak:					
Sisak	16,000	.....	2,000	.....	.....
Pancevo	(2)	.....	.....	.....	.....
Total	24,600	2,600	2,000	.....	

(1) Refinery being expanded to 20,000 bbl. daily. (2) New 26,000-bbl. refinery planned for completion in 3 years.

Single action Colt owned by early Texas Ranger

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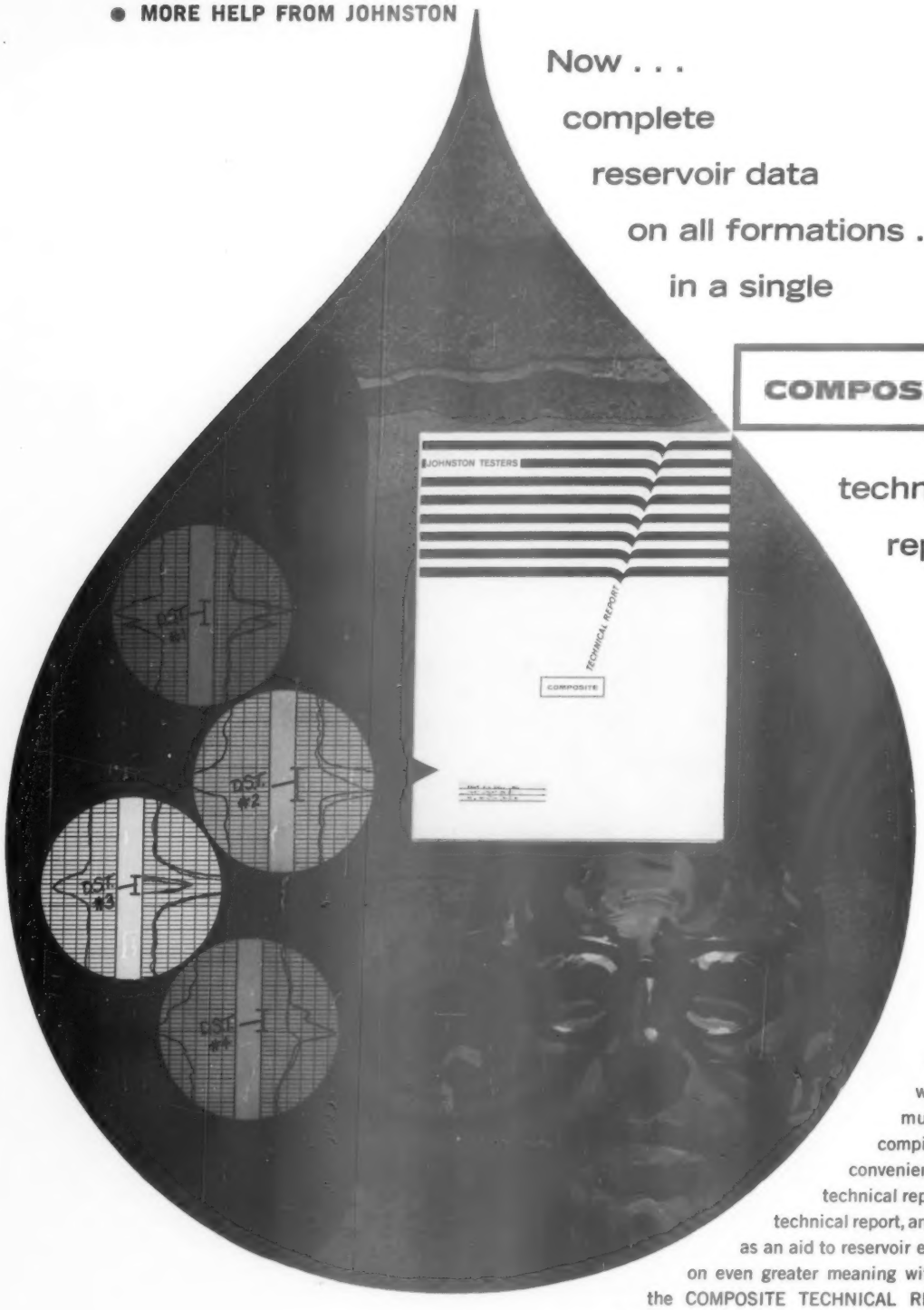

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You can be sure with a computer — in

Figuring optimum power needs

Pipeline characteristics, properties of products, and cost factors are combined and analyzed to provide sounder answers more rapidly

BY PAUL PANCIO, JR.,
Gulf Oil Corp.

FACTS replace assumptions when an electric computer is used to minimize the cost of power for moving oil through a pipeline.

And the use of the computer yields these other advantages over manual working of such a problem:

1. The lowest-cost methods of operation would not have anticipated and time would not allow working more than a few assumptions.

2. The comprehensive hydraulic tape provides a complete hydraulics record of the system.

3. A small program permits the searching of the comprehensive tape for specific operating conditions, such as maximum suction pressure at a station, the best operation of the system if certain pumps should be temporarily inoperable, and the effect of a changing monthly power bill.

In addition to the advantages it has in the calculation of optimum power costs, the program can be used in conjunction with studies made by the engineering department to calculate the hydraulics of other pipelines.

As yet an accurate estimate of the savings realized by the use of the program is not possible because of insufficient usage.

Presented at sixteenth annual ASME petroleum mechanical engineering conference.

The problem. A brief description of the system for which this program was written demonstrates why it was necessary. Although this system was of primary interest, the program is general for any pipeline within the program limits described.

This is a 466-mile crude-oil pipeline from West Texas to near the Texas Gulf Coast. A 20-in. leg extends 112 miles into East Texas from one of the stations. Tankage is provided at the originating station and at the junction of the 20-in. line.

The system began operation in 1953 with three full-horsepower stations. Three intermediate booster stations were built in stages to eventually become full-horsepower stations. All units are electric-motor-driven centrifugal pumps having in excess of 42,000 hp.

In addition, the initial-condition impellers installed in the original stations were replaced with ultimate-condition impellers.

All movement of oil is west to east. The majority of tenders enter the system at the originating station, although some are also injected at two booster stations. All deliveries are approximately at the two eastern ends of the system.

Pump use. The size and operation of the system indicate that an orderly determination of pumps must be made if power costs are to be minimized. When the system began

Determining capacity through . . .

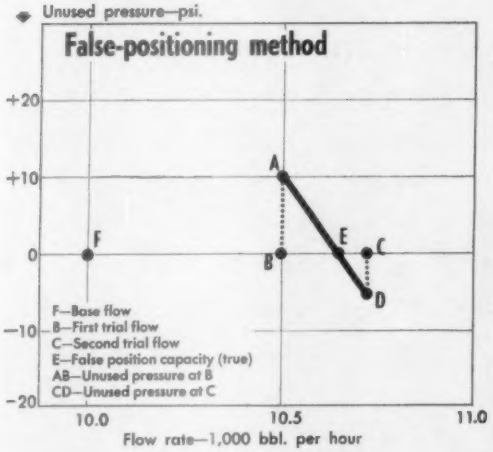


Fig. 1.

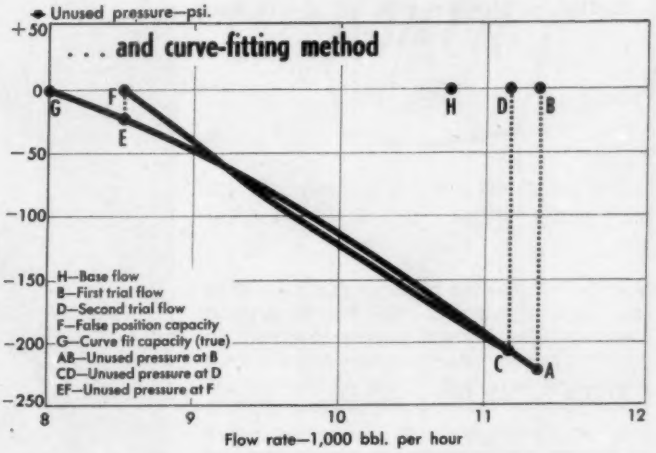


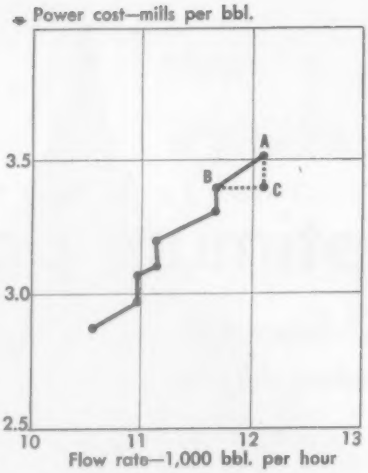
Fig. 2.

operation, a procedure was developed for calculating a pumping-rate table to serve as an operating manual. This listed the proper units to use at each station over the full flow range. Basically, the procedure used was this: A configuration of pumps was assumed at each station, and the capacity of these units was determined. At this flow the monthly cost was calculated at each station. This was repeated, starting with the single smallest unit at the originating station, up to the use of all units.

The above procedure, then, determined the cost at various points, these points being the capacity of each specific scheme of pumps. Next it was determined which combinations of schemes could be made so that by pumping at each scheme's rate for varying portions of a day, it would be possible to average any flow between, while maintaining minimum cost.

Because of system expansion, the existing pumping-rate tables became inadequate. The electronic computer had become available and we decided to use its speed not only to duplicate the manual procedure, but to calculate factors that previously had been assumed.

Variations presented. While the power-optimization problem has been approached from various viewpoints, the significant characteristics of this case are these:



PLOT OF COST per barrel for all flow rates. Fig. 3.

1. The use of a pumping-rate table to make the monthly determination of units to be used at each pump station will give two selections for every flow rate. By pumping at each of the two rates for prescribed times, the exact throughput will be delivered, and no throttling of pressure will occur.

2. The use of equations of the form $y = ax^3 + bx^2 + cx + d$ to represent the head curve (y) or brake-horsepower curve (y) of each pump. A prior curve-fitting routine determines the coefficients a, b, c, and d. Flow rate is designated x.

3. The use of a straight line $y = mx + b$ to represent motor efficiency (y) over the range of normal load. Flow again is represented by x.

4. The method of calculating the maximum capacity of a given scheme of units. A straight-line false-positioning technique plotting unused pressure versus flow, solved for pressure equal to zero, will generally perform this. Exceptions are handled in the program by the solution of three simultaneous equations involving unused pressures and flow rates to determine the coefficients of an equation of the form $ax^2 + bx + c = 0$; one of the roots of this equation will be scheme capacity.

Input Data

Data preparation is relatively short and conforms to that which would be made for manual calculations. These are divided into pipeline characteristics, properties of the product, and cost basis.

Pipeline:

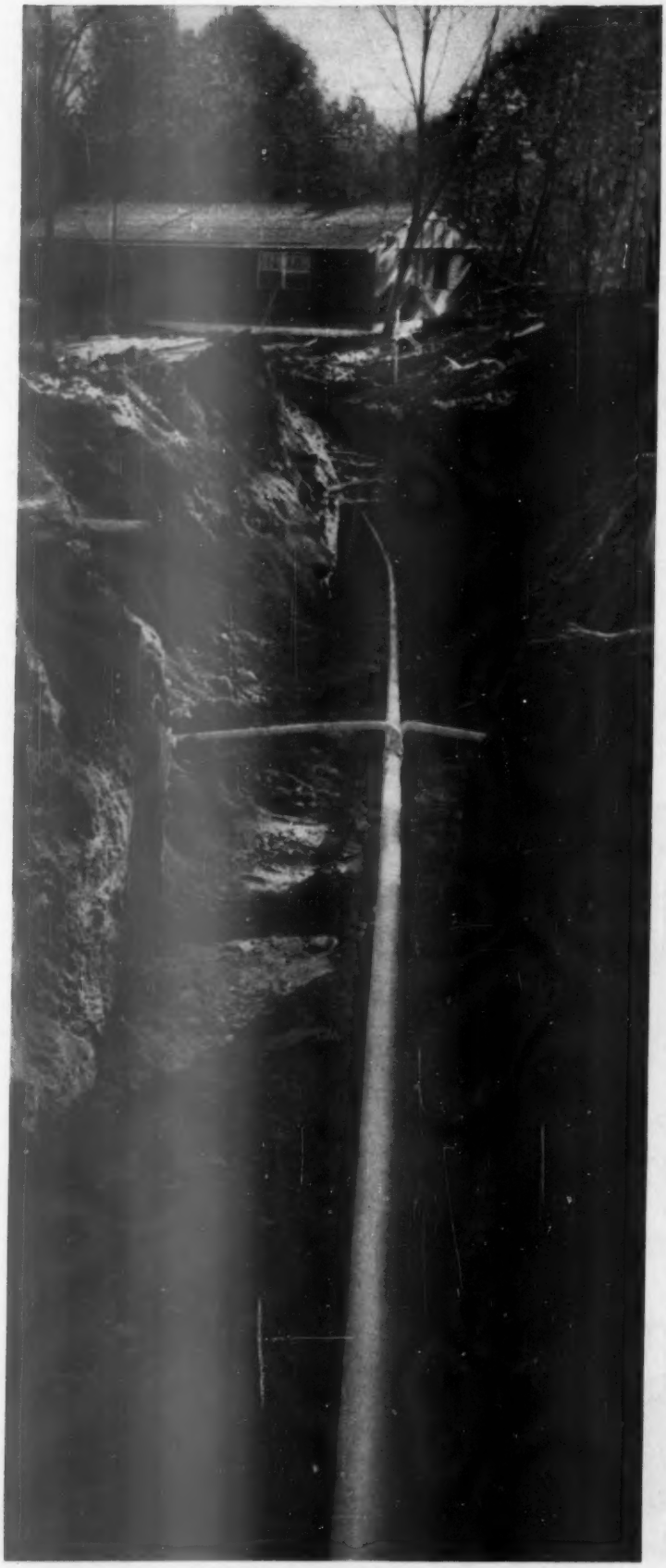
1. Internal diameter of pipe.
2. Equivalent lengths of various piping losses.

ANY PIPELINE COMPANY — SEGMENT: STATION A TO TERMINAL -- NO INJECTION

PUMPING RATE TABLE AND POWER COST PER BARREL — CRUDE OIL: 85° F. 39 SUS 0.8130 SP. GR.

PUMPING RATES IN BBL./HR. AND NO. OF PUMPS				SCHEME	AVERAGE FLOW		HOURS PER DAY		POWER COST
STA. A	STA. B	STA. C	STA. D	NUMBER	BBL./HR.	BBL./DAY	HIGH RATE	LOW RATE	MILLS PER BBL.
10,810	10,810	10,810	10,810						
1	1/2	1/2	1/2	34					
					10,811	259,464	0.05	23.95	2.7530
					10,900	261,600	4.29	19.71	2.7811
					11,000	264,000	9.05	14.95	2.8126
					11,100	266,400	13.81	10.19	2.8441
					11,200	268,800	18.57	5.43	2.8756
					11,300	271,200	23.33	0.67	2.9071
					11,314	271,536	24.00	0.00	2.9115
11,314	11,314	11,314	11,314						
1	1/2	1	1/2	50					

TYPICAL PAGE of pumping-rate table. Fig. 4.



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3. Station and tank-farm elevations.

4. Maximum allowable working pressure.

5. Minimum suction pressure.

6. Elevation and relative location of any hills which might intersect the normal hydraulic-gradient line.

7. Four coefficients representing the pump-head curve and likewise for the brake-horsepower curve for each pump at each station.

8. Number of each type of pump at each station.

9. Constants in the straight-line equation representing motor efficiency over the range of load used.

10. Relative flow rates in each line segment.

Product:

1. Viscosity.

2. Specific gravity.

3. A code number for the appropriate flow formula to be used.

Cost basis:

1. Contract rates for power being purchased.

2. Minimum monthly power bill at each station.

3. Operating labor cost at each station.

When the initial data have been prepared, additional studies of the same system can be made by changing only the new condition. For example, a change in the relative flows in each segment will reflect the result of injecting or withdrawing product. Or a change in the characteristics of the fluid being pumped can adjust for seasonal temperature changes or a change in oil being received for shipment.

Program restrictions. Certain limits that did not hinder the intended use of the program were included. These are:

1. Maximum of six pump stations.

2. Maximum of four different types of pumps at any station. (The number of each type is unlimited.)

3. Electric-motor-driven centrifugal pumps.

4. Flow-rate changes can occur only at pump stations.

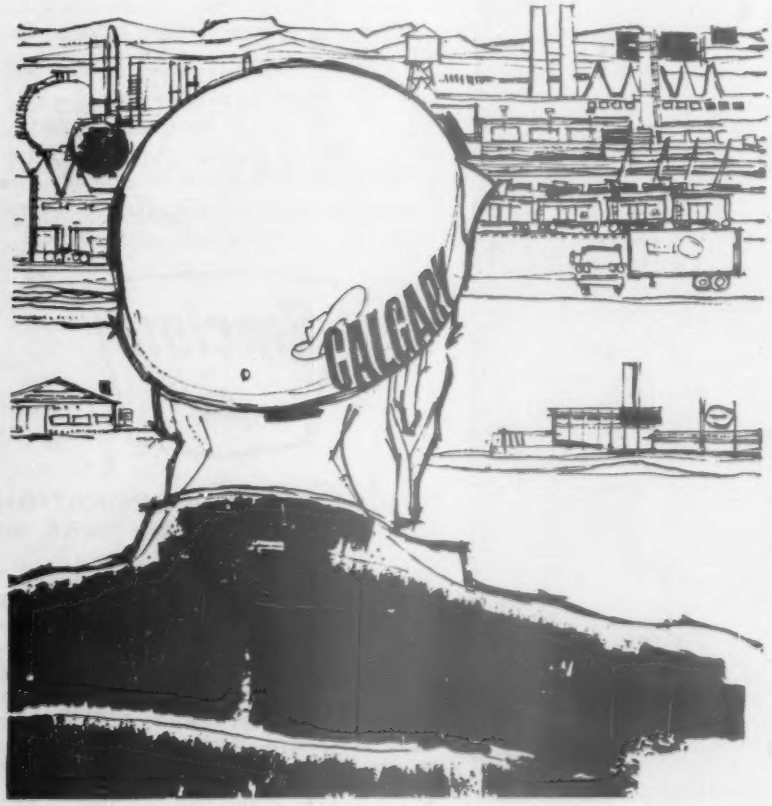
Of these limitations, the first two were imposed by computer storage size. These numbers could be increased by reassembling the program for running on a larger-capacity machine. Since the program was written in the IBM Fortran language, this can be accomplished easily.

Method of Calculating

The program can be divided into three broad categories: hydraulics, cost, and cost analysis. The first two, hydraulics and cost, are worked as a pair, so that once it has been determined a particular scheme of pumps can move a given maximum capacity, the cost of the movement is calculated. After these calculations are complete, the cost analysis examines the data to determine which combinations of schemes will deliver the product at the lowest cost.

Hydraulics. The first relative flow rates in each line segment must be supplied in the initial data. This should be low enough so the smallest possible number of units in the system will be selected.

The calculations are made segmentally and only results for all stations need be placed into memory. The pressure drop per mile is calculated according to one of three equations as determined by a code number in the initial data. These



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CT 3

are the Wilson and McAdams formula for crude oil, and Aude's formula of the Hazen and Williams equation for refined products.

Starting at a predetermined tank in the originating tank farm, the minimum number of tank-farm booster pumps required to supply main-line suction pressure is determined.

Two types of discharge pressure are calculated: discharge pressure required and discharge pressure available. The pressure required is the value read from a line friction curve, while the pressure available is gage pressure. The pressure required is the sum of line friction in the segment, adjustment for static differences of the stations, and pressure added to maintain positive pressure over any hills that would otherwise intersect the hydraulic gradient. The pressure available is that pressure developed by the smallest number of pumps that is equal to or exceeds the pressure required. This is performed by beginning with the smallest unit added to suction pressure and compared to pressure required. Additional units are added in the least possible increments until sufficient pressure is available to meet pressure required.

Pressure exceeded. While the normal suction pressure at the downstream station has been considered, this will usually be exceeded because of the unlikely possibility of perfect matches of the two discharge pressures. Also, any pressure added to raise the hydraulic gradient over the hilltops will ride through into downstream station.

Repeating the same procedure for the remaining stations will then deliver the product to the line's terminus and will have determined a base scheme of pumps that will do the work.

There will exist other pumps capable of moving the product through the pipeline. The legitimate alternatives to the base scheme will only be those that use no more installed horsepower than the base scheme. These alternatives are developed by splitting the line into two segments separated by a station; the upstream stations retain the same units as the previous scheme; the next-higher increment of pumps is placed at the splitting station, subject to pressure restrictions and the availability of more pumps; recognizing the increased suction pressure at the next station, the minimum number of pumps required here is determined, as well as any other downstream stations.

The first alternative to the base is developed by splitting the line at the next to the last station. When no more pumps can be added at a station, the split moves upstream one station and proceeds in like fashion. When the first station is either at maximum allowable line pressure, or all units are in use, all alternatives have been determined.

Capacity varies. While all alternatives now are capable of pumping the trial flow of the base scheme, and all use the same total number of pumps in the system, the maximum capacity that each scheme can achieve without throttling out any pressure will vary by an amount depending on the specific pipeline.

Finding each scheme's capacity is next. This is performed by an examination of "Unused Residual Pressure" coming into each station.

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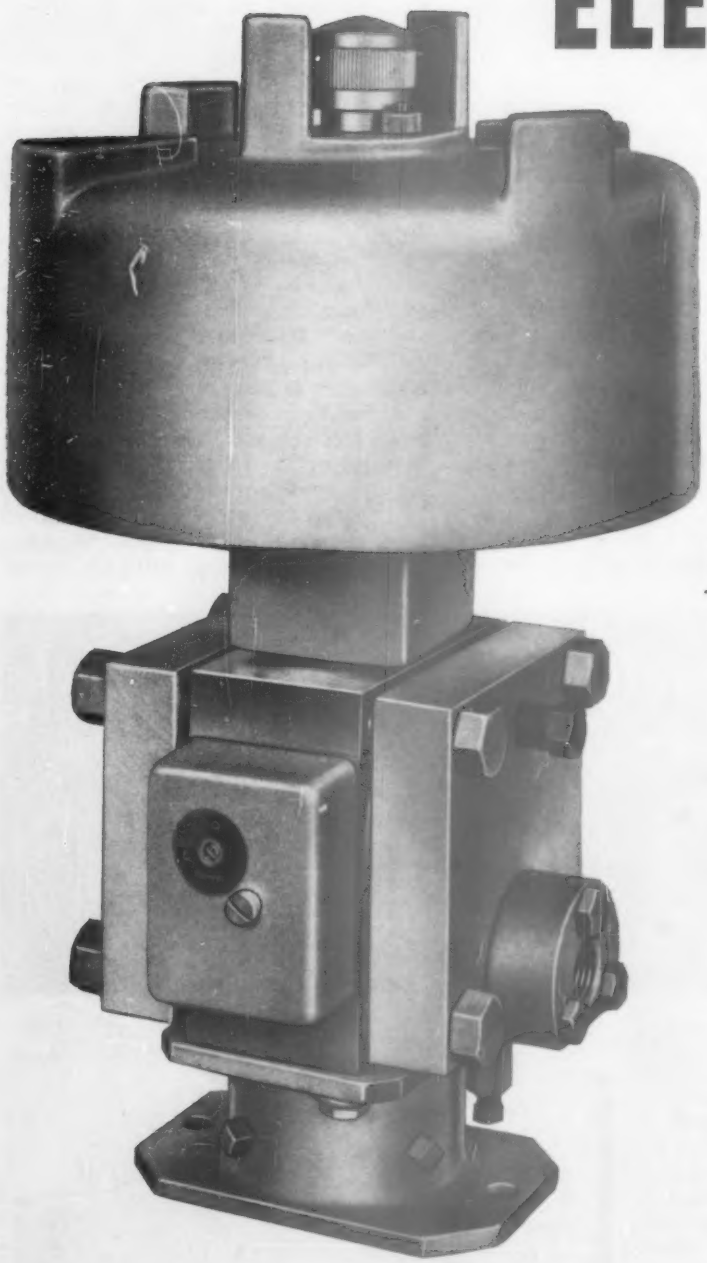

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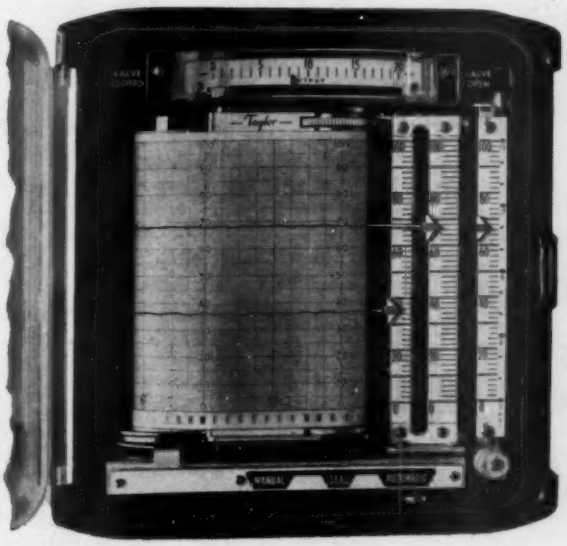

MEAN ACCURACY FIRST

SCHEME NUMBER	BARRELS PER HOUR	TERMINAL RESIDUAL NORMAL	EXCESS	DOLLARS PER MONTH	MILLS PER BARREL
268	12985	25.0	0.4	39877.61	4.2069
	STATION A	STATION B		STATION C	STATION D
Bbl. per hour	12985.	12985.		12985.	12985.
Sp. gravity	0.820	0.820		0.820	0.820
Vis - S.U.S.	43.	43.		43.	43.
Installed hp.	5350.	3000.		1000.	1000.
Brake hp.	4447.	2526.		871.	863.
Kilowatts	3497.	1986.		689.	683.
Hill press	0.0	0.3		1.5	0.0
Normal resid	25.0	25.0		25.0	25.0
Excess resid	22.5	350.3		389.5	234.5
Dis. pr. reqd.	306.8	335.8		273.9	351.8
Dis. pr. avail.	657.2	725.0		506.9	352.2
Demand chg.	4806.94	2881.88		1016.91	989.28
Energy chg.	14839.69	8547.10		3567.84	3014.51
Station cost	19646.63	11428.98		4752.00	4050.00

TYPICAL PAGE of a hydraulics report. Fig. 5.

(Unused residual pressure is equal to gage suction pressure minus normal minimum suction pressure minus pressure added to keep the hydraulic gradient above the hills. It would be throttled out if this flow were to be maintained, or is pressure now serving no purpose but which could be used to pump additional volume.) If the unused residual pressure is plus at all stations, more pressure is yet available and the capacity could be greater. A minus at one or more stations indicates an unworkable condition and the capacity has been exceeded. Therefore, zero unused pressure is present only at the flow that is the scheme's capacity. In practice, ±1.0 psi. was used as well within the bounds of operating accuracy.

The trial flow is somewhat less than scheme capacity, as noted. It was apparent that adding 500 bbl. per hour to the trial flow rate would approximate the capacity. At this flow rate suction and discharge pressures are calculated at each station to determine the unused residual pressures. The sign test is made to determine if this flow is above, below, or at capacity. Since this first try will seldom be actual capacity, 200 bbl. per hour will be added or subtracted, depending on whether this trial flow was below or above capacity as determined by the sign of the unused pressure. Thus a range of 400 bbl. per hour is available to bracket the answers, and this is generally sufficient.

Normal routine. The normal routine will be that the capacity is between the two trial flows. The station having the least measure of unused residual pressure will be the controlling station. A straight-line plot (Fig. 1, A D) is made of the controlling station's unused pressures (A B and C D) versus the two trial flow rates. At zero pressure (E) is the forecasted flow which should be capacity. Suction and discharge pressures as well as unused residuals are calculated as above to verify this.

The straight-line false-positioning technique is correct even when the answer is slightly outside the 200-bbl. per hour range of the trial flows. A safeguard was provided for any unusual circumstances where the capacity is at an extreme distance from the trial flows, and the false positioning was not the capacity. A second-degree curve fit is made through the three unused pressures at the controlling station. The intersection of this curve with zero pressure is the forecast of capacity. Suction, discharge, and unused pressures will be calculated at this flow to verify the forecast as capacity.

When the program is used as originally planned, the straight-line false positioning is the final capacity calculation. The additional routine is protection against defining an error as the correct answer, and also permits greater leeway in using the program. The efficiency of the straight-line fit, and the operation of the curve-fitting technique are illustrated by this test made during the testing procedures: Note in Fig. 2 the negative unused pressures A B and C D for the first two trial flows. A straight line through A and C determined point F as the false-positioning capacity. Calculation of pressures here, however, determined unused pressure equal to E F actually existed. A second-degree curve fit through A, C, E then defined point G as capacity, and the calculation of pressures verified this.

After the capacity of each alternative has been computed, the total brake horsepower at each station is calculated. As noted earlier, the brake-horsepower curve of each type of unit is represented by a third-degree polynomial equation. This equation is solved for horsepower at the flow equal to capacity, and multiplied by the number of this type of unit in use.

A straight-line equation was found a good fit of motor efficiency versus flow, over the operating range. This is used with the brake horsepower of each type of unit to calculate the kilowatts of power that will be drawn by the motor, and summed up by stations.

Cost

As noted earlier, the total kilowatts of power at each station in each scheme has been calculated and carried forward. Since costs are being computed on a monthly basis, the energy in kilowatt-hours per month is easily calculated. Demand and energy satisfy the requirements for entering the power contract.

Each station's contract for power rates was written as a specific program. Writing a single general program was considered and rejected because of the unlikely possibility of forecasting all provisions in a future contract.

The separate demand and energy charge are retained intact. However, in summing up all stations' costs

for a scheme cost, the sum of each station's demand and energy is compared to its minimum monthly bill, and the larger, of course, is used. A system power cost per barrel is computed from the system monthly power cost.

An additional consideration other than power cost has been included, though not used. This is the labor cost for operating personnel at the pump stations. Included in the initial data are the operating cost for the normal station complement and the cost of standby personnel that would be anticipated if the station were idle. Thus it would be possible to study the net effect of paying the minimum power bill at an idle station which had operating savings to offset this penalty. There might be many varied operating reasons for using this consideration that would best be decided when needed. Power plus labor cost is likewise calculated per barrel.

Comprehensive tape. During the cost phase, the cost data are added to the hydraulic data to produce a comprehensive tape that retains all the hydraulics and cost breakdown for each scheme developed. The final result is the recording of the hydraulics and cost information for every possible pump configuration in the system. At the same time a second tape is being prepared with a selected few of the lowest-cost schemes. This tape has cost data for the lowest-cost schemes recorded from each group of alternatives (the lowest from all schemes using the same number of pumps). It also contains what might be termed the "next best" and so on, should more exist (the next best is the lowest-cost scheme of those whose capacity is greater than that of the lowest cost).

This completes the cost calculations that are made. As mentioned before, the hydraulics and cost are worked as a pair. At the completion of the cost phase the program becomes self-perpetuating in this manner: the scheme with the largest capacity has been recorded; by adding even 50 bbl. per hour to this rate and re-entering the hydraulics phase at the beginning, a pump selection will be made and it must of necessity require no more pump than the previous calculation. The alternatives are developed, capacities found, and costs figured. This process repeats itself either until stopped or ultimate line capacity has been reached by using all the pumps in the system. In either case, the cost analysis is performed next.

Cost Analysis

The input to the cost analysis is the two tapes just noted: one containing hydraulics and cost data (the comprehensive tape), the other containing only cost data for the lowest schemes (lowest-cost tape). The schemes on the comprehensive tape are arranged in approximate order of increasing flow rate, while the lowest-cost tape is in exact sequence of increasing flow. Thus the last scheme on this tape has the greatest capacity and will be the first to be used in further calculations.

The purpose of the cost analysis is to find the one scheme from the comprehensive tape that when used for a part of a day in combination with a scheme from the lowest-cost tape will achieve the lowest cost for the flow rates between them. In this manner, the system is operating without throttling out excess pressure at any time. While the pumping rate will always be above or below the daily throughput to be maintained, the exact flow will be attained by pumping at each of the two rates in a manner so as to average the desired throughput.

A scheme from the comprehensive tape must meet these specifications in order to qualify as a possible combination of a scheme from the lowest-cost tape:

1. Flow rate less than that on the lowest-cost tape.

2. No station may draw more kilowatts of power except if both schemes are already paying the minimum monthly bill.

For those schemes that qualify, the cost line (A B, Fig. 3) is drawn between the two schemes, and its slope is computed (A C/B C, Fig. 3). Since these cost lines are radiating back out of the scheme with the higher flow rate (A), it is seen that the line with the steepest slope will maintain the lowest cost for those flows immediately less than that of the lowest-cost scheme (A). These combinations are made until the capacities of the schemes on the comprehensive tape begin to exceed that of the lowest-cost scheme being worked. As each slope is calculated it is compared to a location in which the previous greatest slope has been stored. Thus when all combinations have been made, the best has been retained in memory and both schemes of the combination are written on an output tape.

This procedure is continued until all the schemes on the lowest-cost tape have been put into combination with a scheme from the comprehensive tape. The output tape at this stage could be summed up thusly: Use the following two sets of pumps; their appropriate pumping rates will be as follows; use these pumps between the following range of flows; the power cost per barrel at each end of the range is as follows; plus other data of an informational nature.

The final calculations will add to this output tape the cost per barrel and the hours per day to pump at each rate in order to average every hundred multiple of flow between the two pumping rates. In addition, since the calculations have been performed in floating-point form, the output data are converted to fixed-point form and punched into cards for greater readability.

Output

A theoretical page of a pumping-rate table is shown in Fig. 4. A complete book covers the range of flows from the lowest possible by using the single smallest pump at the first station, through system capacity using all pumps. Succeeding pages provide a continuity of flows.

The calculation of this table was the primary objective in undertaking this project. Its use is simply a matter of locating the one page that has the throughput forecast for the coming month. Of greatest importance is the definition of the maximum number of units to be run at each station. Thus operating options using fewer units are permitted, but the ceiling is set.

The simulation of a pipeline obviously includes the calculation of the hydraulics data of the system. As noted before, the normal working of the program places this information on the comprehensive tape. The station-by-station buildup of cost also appears. While this was not one of the goals of the project, nevertheless its value is quite extensive. As a matter of information, then, this tape was printed out for the engineering department, Fig. 5.

USS 9% Nickel Steel reduces cost of handling low-temperature liquids

Today, more than 400 pressure vessels made of 9% nickel steel are providing economical service at temperatures down to −320°F, the boiling point of liquid nitrogen. The pressure vessels shown here are designed for liquid oxygen storage at −297°F. Low carbon, 9% nickel alloy steel was developed to provide a ductile, moderately priced steel for storing such cryogenic liquids as ethylene, methane, oxygen and nitrogen in the temperature range from −150°F to −320°F.

USS 9% Nickel Steel maintains good strength, toughness, and excellent ductility at sub-zero temperatures down to −320°F. At room temperature it has a minimum yield strength of 65,000 psi and high charpy impact values, while at −320°F, double-normalized and tempered 9% nickel steel shows a 36% increase in yield strength, and charpy keyhole impact values range from 20 to 40 ft/lbs. Since tensile properties and impact values are even better for quenched and tempered 9% nickel steel, recognition by various code groups of the suitability of such heat treatment is now being considered.

10% lower costs. Accumulated data on cryogenic vessels of 9% nickel steel suggest that minimum savings of 10% of the final erected costs can be expected from reductions in material welding and fabricating costs alone, in comparison with non-ferrous metals. Economies due to higher strength are also possible. An allowable ASME working stress of up to 23,750 psi permits reduction in vessel weight with lower unit costs.

Acceptance of 9% nickel steel in the quenched and tempered as-welded condition by code and regulatory bodies would make this steel even more attractive to designers and fabricators since the vessel would cost less to produce without stress-relieving and would be less expensive to the user.

Results of "Operation Cryogenics." Impact tests conducted late in 1960 on three full-size rectangular vessels refrigerated to −320°F, showed that 9% nickel steel vessels in the as-welded condition (not stress-relieved) could withstand impacts far beyond any likely to occur in service. Burst tests on six cylindrical vessels, also at −320°F, showed that burst pressure for the three as-welded vessels (not stress-relieved) averaged higher than that of the three stress-relieved vessels. Burst pressure for all six vessels was at least four times the design pressure. These tests proved that 9% nickel steel has the high strength, low temperature toughness, and weldability needed for cryogenic pressure vessels.

For the complete story of USS 9% Nickel Steel, including all the details of "Operation Cryogenics," write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.

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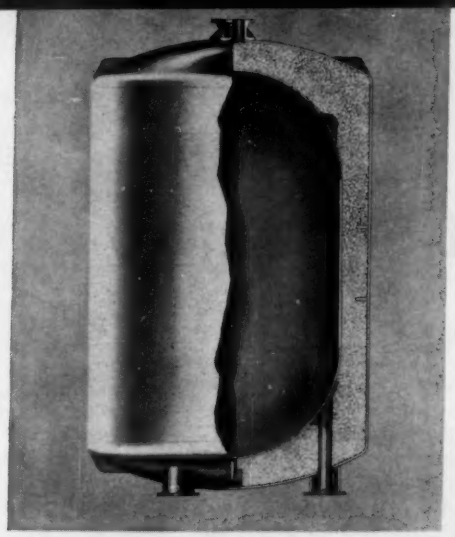

Above, cutaway view shows typical insulated 9% nickel steel pressure vessel nine feet in diameter and 16 feet in over-all length. Outer tank is structural carbon steel. **Left and below,** cylindrical pressure vessels for handling liquid oxygen at −297°F during fabrication from USS 9% Nickel Steel at Pittsburgh-Des Moines Steel Company. Vessels like these will be used by Air Reduction Company, Inc., New York. Each one holds the equivalent of 550,000 standard cubic feet of oxygen gas in liquid form, at a normal design pressure of 270 psi and was stress-relieved after welding in accordance with 1961 ASME regulations. Plate thicknesses are 0.700" in the shell plates and 0.375" and 0.350" in the hemispherical head segments. These vessels are designed and stamped in accordance with the ASME code. Vessel at left is ready to be insulated and inserted in its carbon steel shell, while, below, a welder completes a bottom head.

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106.

Cost of refinery-storage maintenance

BY W. L. NELSON
Technical Editor and Petroleum Consultant

ALTHOUGH average figures for maintenance costs can be stated, the value of such figures is doubtful because all degrees of need (of maintenance) are encountered as well as the fact that some managements require good maintenance whereas others refuse to spend except when failure occurs. Painting is a good illustration of the variations encountered. Most management points with pride at well-painted tanks, but tanks which appear to have never been painted are not unusual. However, the cost of specific storage-maintenance situations can be estimated as outlined herein.

The main maintenance expense is the repair of roofs that have been destroyed by exposure to sulfide gas. Roof life may be as short as 2.5 years when storing sour cracking stock or gas oil[15] and as short as 2 years in extreme service[14]. Table 1 indicates the roof life, etc., as reported in some of the literature. Averages are shown in Table 1 for use in the computations presented herein. Comprehensive average data are not available and hence one can only assume how much of the total storage is exposed to severe conditions. Average total refinery storage[11] amounts to about 70 bbl. per bbl. of refinery capacity:

Crude	30
Products	40

Possibly more than half of the crude storage encounters severe or corrosive conditions but probably less than a quarter of the product storage is exposed to severe conditions. Thus, possibly only 35-40% of the total storage is exposed to severe corrosion.

The situation with respect to painting is even more obscure. Perhaps 40% of the product storage is painted (white or aluminum) to alleviate vaporization losses, but the rest of the storage may or may not be painted depending on the pride of management or the reinvestment value of its capital. Probably 80% of the total storage capacity is painted as frequently as indicated in Table 1, and possibly one-third of the storage is located near the coast or encounters severe conditions.

Scarcely any information is available on the frequency at which upper rings and bottoms must be repaired but Table 1 and the literature indicate that such expenses are encountered only about one-fourth as frequently as roof repairs.

Table 1—Life of storage tanks in severe-corrosion service, years (ranges in parentheses).

Roofs				Painting frequency, years	
Sour crude	Sour distillates and intermediate	Top rings	Structural	Coastal or severe	Inland
6-8[12]	4-7[12]	†12[6]	...	3-6[7]	10-15[7]
8(3-12)[6]	7(4-14)[6]	...	...	6[8]	10-15[8]
*7[9]	†4-6[8]	*25[8]	*20[8]	¶7.5-11[8]	...
5.3-11.6[8]	‖3.8-14.3[8]	...	...	...	...
over 4[13]	6.5(3½-10)[13]	...	...	...	...
§2[14]	‡2.5-6[15]	...	...	...	...
7.5	5.7	19	18	5	12

*Nine companies, 200-300 large and small tanks. †Computed for 3/16-in. thickness. Applies to reduced crudes and cracked residues. ‡Intermediate storage for cracking stocks and gas oil. §Extreme case. Some decks unsafe after 1 year. ¶70-100 tanks of 750 total, painted each year. ‖Caustic washing prolongs life about 5.4 years.

Table 2—Cost-breakdown comparison of various means of repairing tank roofs, dollars each.*

	3/16-in. welded steel	3/16-in. riveted galvanized steel	3/16-in. welded aluminum	Resin (4 coats)
Tank cleaning	240	240	240	240
Preparation	1,530	1,530	1,530	855
Repair material	750	920	1,850	50
Repair labor	450	900	600	150
Overheads	1,025	1,260	1,200	290
Down time	290	325	325	290
1951 total	4,285	5,175	5,745	2,055
1946 total†	2,850	3,450	3,820	1,370
1960 total†	6,430	7,760	8,600	3,080

*40-feet diameter. †Converted from 1951 to 1946 by Table 3, and can be brought to other dates in the same way.

Cost of roof repairs. McConomy and Hur[9] have studied completely the cost of roof repairs. They derived equations for the 1951 costs of cleaning, preparation, and repair materials and labor, and also evaluated the cost of comparing overhead and down time so that the costs for any specific job can be estimated. The equations cannot be presented here but Table 2 (Table 5 of the McConomy and Hur paper converted to a 1946 cost basis by the use of Table 3 here) shows the roof-repair costs for a 40-ft.-diameter tank which is considered to have a life of 6 years. Such a tank might have a capacity of 3,000 - 4,000 bbl. and would cost (1946) about $1.60 per barrel. (Costimating No. 3, OGJ, Dec. 5, 1955). On such a basis the repair cost for a welded steel tank amounts to about 13.6 cents (1946) per barrel capacity per year, or about 8.5% per year of replacement cost. The 1960 cost is about 30.6 cents per barrel.

Painting cost. The Questions on Technology page[10] of May 12, 1949, completely summarizes the cost of painting. The cost of painting tanks is only about 60% of the cost of an average paint job. This is included in Table 4 and a basis of 1946 is employed by use of Table 3. If a primer coat is used, note that the cost of hand cleaning should be deducted from the total costs for the other kinds of paint.

Total maintenance cost. Fig. 1 is an indication of the total cost of maintenance as percentage of tank-replacement cost. Size of tank has only a

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Table 3—Cost indexes for tank repairs and painting (Basis 1946).

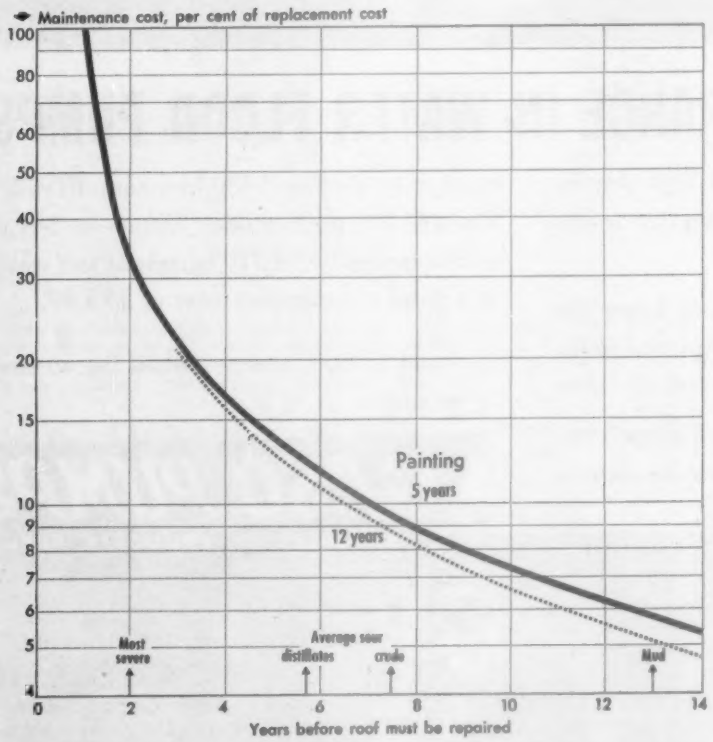
	Steel plate	Structural ironworkers	Nelson construction	Tank repair*	Paint	Painting†
1946	100	100	100	100	100	100
1947	117	112.5	117	114	133.5	119
1948	131	125	132.5	128	141.4	132
1949	142.1	129.5	139.7	133	142.8	137
1950	152.3	135.5	146.2	140	140	146
1951	160	144.5	157.2	150	153.8	153
1952	163.1	151.5	163.6	156	155.7	166
1953	175.8	160	173.5	166	156.7	169
1954	187	165.5	179.8	173	159	176
1955	195.1	172	184.2	179	161.4	181
1956	215.9	179	195.3	189	169.2	190
1957	241.8	188.5	205.9	202	178.1	200
1958	252.7	195	213.9	210	180.9	208
1959	257.4	205.5	222.1	219	179.9	216
1960	214.3	‡214	228.2	225	181.2	224
1961	‡255	‡222	‡232	231	‡181	229

*60% Ironworker labor, 20% each plate steel and Nelson construction. †70% Refinery construction labor, and 30% prepared paint. ‡Estimate.

Table 4—Approximate effect of kinds of paint on the 1946 costs of painting tanks and similar equipment.

Kind of paint—	Coverage* (sq. ft. per gal.)	Material and labor† ($/gal.)	Hand cleaning‡ ($/gal.)	Total cost $/gal. applied	Factor	Total cost $ per square†	Factor
Average	...	...	...	11.20	1.00	6.00	1.00
Iron oxide primer	250-300	4.10-5.62	4.90-5.67	10-11	0.94	5.55-7	1.04
Aluminum	300-400	5.00-6.02	4.80-5.93	§ 9.40-12	0.96	§5.35	0.89
Black	500-600	6.87-8.12	7.03-8.15	§13.80-16	1.34	§5.05	0.84
White	300	7.50	4.80	§12.25	1.10	§7.00	1.17

*One coat. The second coat spreads farther by about 50-100 sq. ft. per gal. †Two coats. The second coat costs only half as much as the first. ‡Great variations. These values are for common practice. Sandblasting costs at least double that of hand cleaning, and may, on occasions, be four times as costly. §These include cleaning and hence somewhat lower costs should be used if these are applied over a primer (which already includes cleaning).



APPROXIMATE COST OF MAINTENANCE as a function of frequency of roof repairs. Fig. 1.

small effect because maintenance costs and investment costs rise and fall together. However, maintenance costs for very large tanks are about 10% less than the costs shown in Fig. 1, and for the very smallest tanks about 10% larger.

Included in Fig. 1 are repair costs similar to Table 2, painting costs from Table 4, and 10% of the repair costs (Table 2) for the repair of side rings and bottoms.

Average maintenance costs can be estimated from Fig. 1 by estimating the proportions of severe and mild conditions. Thus, if 35% of the storage encounters severe corrosion and 65% mild, the average yearly cost is about 6.8% of replacement cost. If the average tank size is 8,000 bbl. and its cost is $1.12 per barrel. (1946 or $1.43 in 1948) the yearly cost of maintenance in 1948 would be about 9.7 cts. per barrel. Costs at the Philadelphia refinery of Atlantic Refining Co. in the years immediately preceding 1951 were about 9.8 cents per barrel[9].

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Head of medical laboratory defends TEL and TML additives at California legislative hearing, declaring flatly that

Leaded gasoline poses no threat to public health

Evidence has demonstrated that quantities of lead ejected from body are about equivalent to those that are taken in

THERE IS NO health hazard involved either in the distribution or use of leaded gasoline.

In fact, studies of the effect of leaded gasoline on the atmosphere show not even a threat to public health exists.

These are the conclusions reached by Robert A. Kehoe, MD, director of the Kettering Laboratory at University of Cincinnati's department of preventive medicine and industrial health.

Dr. Kehoe, who outlined his views at a recent legislative hearing in Los Angeles, has come out flatly against proposed legislation which would prohibit the use of antiknock compounds in gasoline. His views are not only important to Los Angeles refiners but also to refiners in other areas where air pollution is a growing problem.

Rather than a ban against leaded gasoline, Dr. Kehoe suggests systematic checks of people exposed to air pollution and studies which "will indicate the sources and the order of magnitude of any significant changes in the exposure of the public to lead." Such studies would provide the basis for any control measures.

TML. Dr. Kehoe, whose work in lead compounds dates back to 1925, said there also is no problem associated with the use of tetramethyl lead, which is the most volatile of the lead alkyls.

The TML question was presented to the staff of the Kettering Laboratory, who bore the responsibility for advising the industries involved in matters relating to industrial and public health. Dr. Kehoe pointed out that any additional increment of organic lead in the atmosphere which might be used instead or along with tetraethyl lead would reach its maximum, not in the areas of dense vehicular traffic, but at sites at which the vapors of gasoline have the greatest access to the atmosphere, i.e., at refineries, storage terminals, and service stations, where gasoline is being moved from one container to another without being completely enclosed.

Prior to the introduction of gasoline containing tetramethyl lead this question was investigated under conditions which intensified somewhat those conditions which would arise in ordinary service - station operations.

The results demonstrated the potential hazard associated with the substitution of TML for TEL was insignificant within the time occupied by this investigation.

The data obtained by the determinations of lead in the atmosphere of the installation under various operating conditions, and by the analyses for lead of the urine and blood of the operating personnel, indicate that there was little likelihood of a significant degree of absorption of lead by the exposed personnel even after a long period of employment.

Nevertheless, since May 1960, when gasoline containing TML was introduced in California, the atmospheric conditions have been checked periodically.

In addition, representative operating personnel were examined before and after 16 months of exposure to the occupational conditions, and quarterly determinations of the lead content of their urine and blood were made. Thus, enough information has been obtained to delineate both the nature and the effects of the environmental conditions with respect to lead.

There is undoubtedly a measurable increase in the concentrations of organic lead in the atmosphere in immediate proximity to the points at which gasoline containing TML is flowing from one open container to another, e.g., very near the tank of car being filled at a service station.

The low concentration of organic lead in the atmosphere at such sites are so diluted by air currents as to diminish greatly and rapidly in the air at sampling sites some feet away from the filling nozzle.

It is possible, only fleetingly and in minute traces, to detect organic lead in the atmosphere of the general areas in which men carry on their daily work. After as long as 16 months of such work these men fail to yield any evidence of a measurable degree of occupational absorption of lead.

As long as the lead content of the fuels is equivalent, there should be no change in quality or quantity of inorganic lead discharged into the atmosphere by automobiles when lead alkyls lighter than TEL are used.

Dr. Kehoe said the results of the field investigation and from a consideration of the nature of the combustion products of the alkyl compounds of lead which are used in motor gasoline, the conclusion is reached that the use of TEL in motor gasoline, in relation to the public health, are applicable in every way to the entire spectrum of alkyl com-

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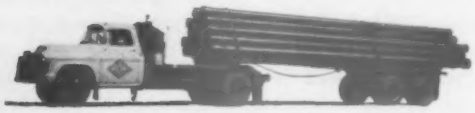

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pounds of lead now in use.

Lead in exhaust. The average concentration of TEL in the regular gasoline in Los Angeles is 1.71 ml. per gal., and in premium gasoline, is 2.33 ml. These concentrations may be expressed for simplicity as 1 part by volume of TEL in 2,200 and in 1,600 parts, respectively, of gasoline.

The maximum concentration of TEL used in any gasoline in California or in any other part of the United States is 4 ml. per gal., or 1 part by volume in 945 parts of gasoline.

The maximum concentration of TML in current use is 2.06 ml. per gal. of gasoline, this being the concentration of this compound which corresponds in its content of metallic lead with 3 ml. of TEL.

These compounds appear in the exhaust gas as inorganic compounds of lead, chiefly the chlorobromide, but also as sulfate, carbonate, phosphate, etc., according to the presence and the concentration in the exhaust gas of these and other anions.

Only minute amounts of the lead alkyls, in the absolute sense, escape combustion, and therefore, only minute amounts are discharged from the combustion system into the atmosphere.

These quantities are so minute as to evade even qualitative detection in the general atmosphere of urban areas, despite the high sensitivity of current methods of analysis, Dr. Kehoe said.

Only a portion, ranging from 25 to 75% of the lead which enters the engine in the fuel, is discharged from the tailpipe of the automobile in city driving, according to Dr. Kehoe.

Of the lead which condenses out in the exhaust system of the engine at low speeds of operation, much is discharged during accelerated speeds in flakes and chunks too large to become airborne.

Lead in the atmosphere. The concentration of lead in the atmosphere of American cities varies from city to city, from one area to another in any one city, and from time to time during the day, week, month, or year, according to the activities according to the weather, and according to topography.

In Cincinnati, where information about this matter has been obtained over a comparatively long period of time, the concentrations range from 1 microgram (μg.) to somewhat more than 6 μg. per cu. m. of air.

Lead in the body. The food consumed by an adult in the U. S. contains lead in amounts which range from less than 0.1 to 4.0 mg. per day and average around 0.33 mg.

The quantities taken in daily with the inspired air are not so well de- and patterns of activity of city life, fined since they must always be the calculated product of the average concentration of lead in a volumetric unit of the air breathed in by the individual during each period of 24 hours, multiplied by the total number of the volumetric units of such air breathed in during that period.

On this basis, Dr. Kehoe said, these quantities range between 15 and 100 μg. per day (0.015 to 0.10 mg. per day, when expressed in the same manner as the lead ingested in food and beverages), and, as in the case of the intake in food, the average in any situation is probably much nearer the low value than the high.

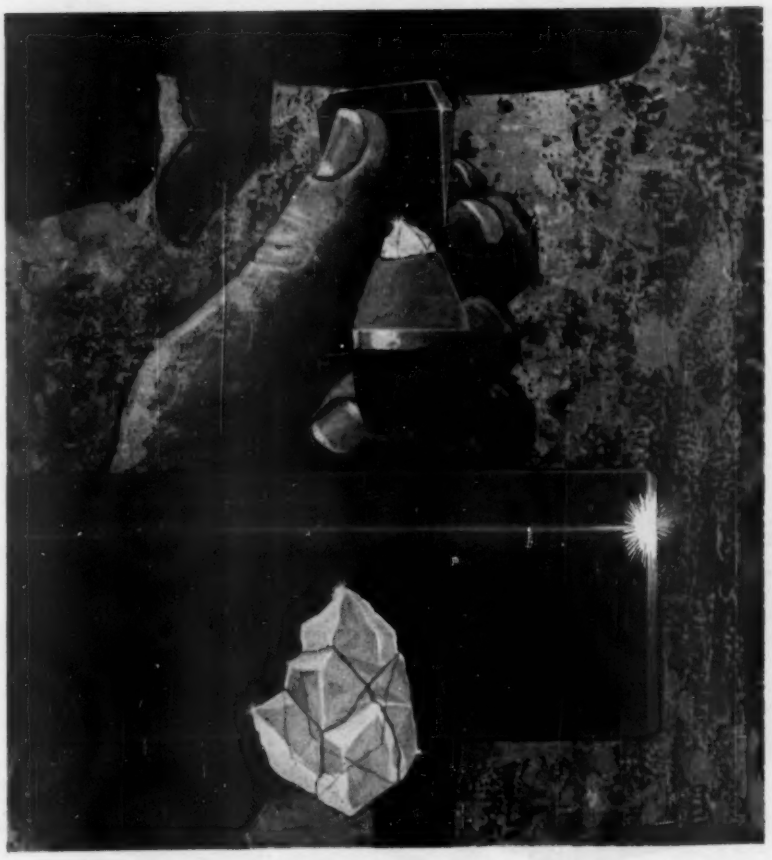
The Kettering laboratory studies show the maximum quantities of lead absorbed into the body from that taken into the alimentary and respiratory tracts of the average man may be determined with approximate accuracy on the experimental evidence which shows that somewhat less than 10% of that ingested (swallowed), and somewhat less than 50% of that inhaled, are absorbed.

Such calculations indicate that some 30 μg. ($\pm$0.03 mg.) are absorbed daily from the alimentary tract, while between 7 and 50 μg. (0.007 to 0.05 mg.) may be absorbed daily from the respiratory tract.

Evidence has demonstrated that the quantities of lead ejected from the body are about equivalent to those taken in.

Thus, the lead which is evacuated with the feces daily correlates with that in the food and beverages. That which is excreted in the urine ranges from somewhat less than 10 μg. (0.01 mg.) to about 80 μg. (0.08 mg.) per day, and averages approximately 30 μg. (0.03 mg.) per day.

The total output of lead in the feces and urine, over a period of



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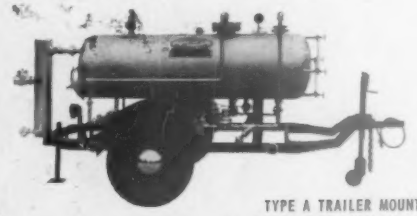

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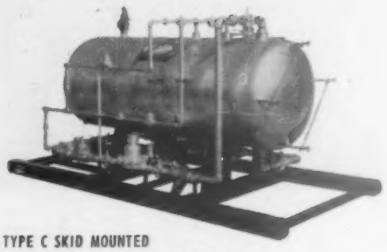
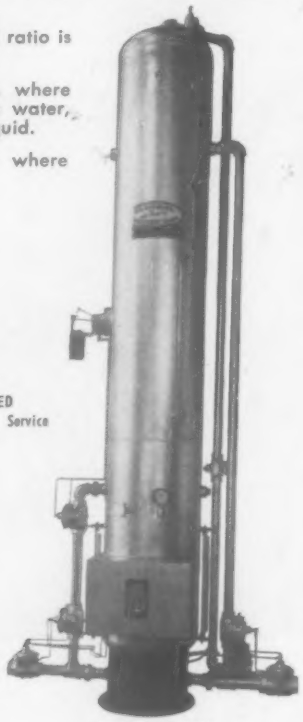


TYPE C SKID MOUNTED
For Manifold and Battery Installations



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In flush primary production, where high gas-oil ratios are encountered, we recommend the use of METROL Metering Separators and Well Testers.

In all A, B, and C units the oil-water interface control pilot is externally mounted and is actuated by an internally mounted weighted float. This pilot actuates the water dump valve. Types D* and E* units have optional interface controls: an adjustable Weir-type control or the same liquid level control pilot and water dump valve used in the A, B, and C units can be used.

Types A, B, and C are available in O.D.'s of 16", 24" and 30" in 6'-0" shell length; in O.D.'s of 36" and 48" in 7'-0" shell length; W.P. 125 and 300 psi.

Type D Horizontal Units with integral oil and water metering compartments are available in O.D.'s of 24", 30", 36", 48"; shell lengths of 9', 10', 12', and 13'; W.P. 125 and 300 psi. Type E Vertical Units with integral oil and water metering compartments are available in O.D.'s of 24", 30", 36", and 48"; shell lengths of 12', 13', 16', and 17'; W.P. 125 and 300 psi.

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months, usually exceeds slightly the intake in the food and beverages, thereby disclosing, indirectly, the approximate order of magnitude of that absorbed in the respiratory tract, which in the case of persons investigated in Cincinnati, is of the approximate order of 20 μg. (0.02 mg.) per day.

The result is that under the conditions which exist in the U. S. today, the quantity of lead which is being absorbed daily by the average adult citizen who is not subjected to occupational or otherwise unusual types of exposure to lead, is balanced for all practical purposes by the excretion of a corresponding quantity of lead.

The concentration of lead in the blood varies to some extent with the current rate of the absorption of lead, but is relatively slow in reflecting this rate unless the current rate of absorption is very rapid, Dr. Kehoe said.

It best represents the approximate state of the body generally, with reference to its over-all burden of lead.

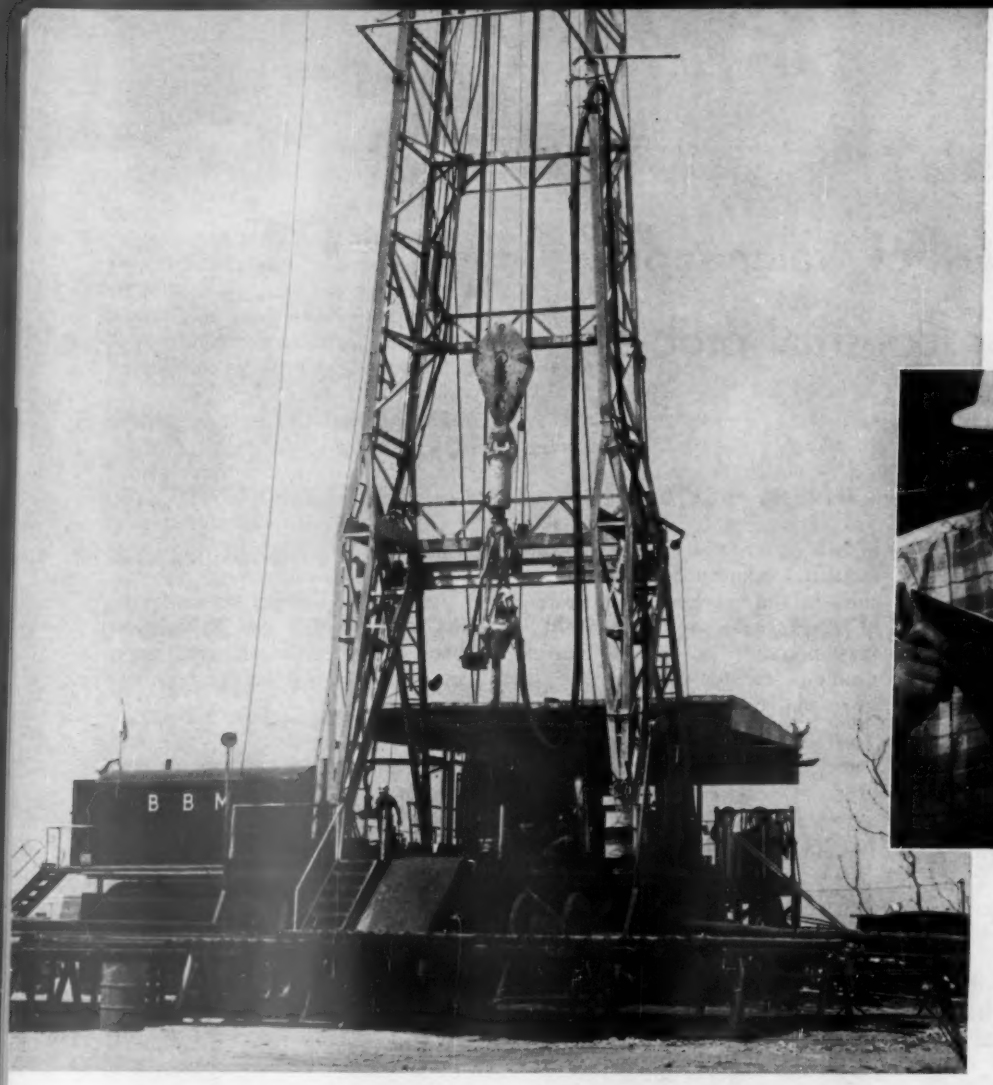
Threshold values indicative of the dividing line between safe and dangerous degrees of occupational absorption of lead are, approximately, the concentrations of 150 μg. (0.15 mg.) per l. in the urine and 80 μg. (0.08 mg.) per 100 g. in the whole blood, according to Dr. Kehoe.

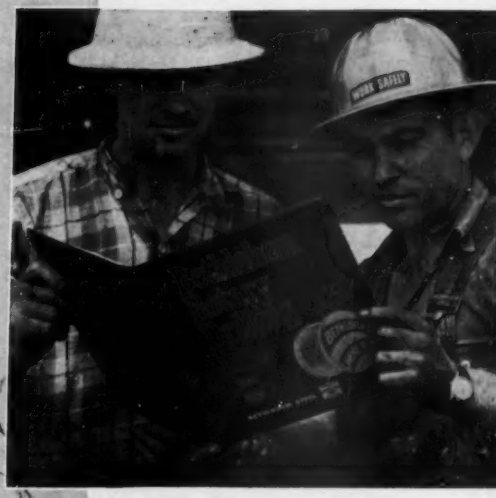
He said if these values are in error, they are on the low side since they are somewhat more severe than they might be in relation to industrial requirements.

Periodic checks of the excretion of lead in the urine and the concentration of lead in the blood shows it is a "well-documented fact that no evidence has been found of a significant change in the lead metabolism of persons in the general population who are free of occupational or other unusual opportunities for exposure to lead," Dr. Kehoe said.

He said this claim is based on surveys which have been conducted since adequate analytical methods were developed in 1937-38.

"Moreover, there is no indication that groups of persons in Los Angeles are absorbing lead at a rate that is significantly greater than that of corresponding groups in Cincinnati."





Toolpusher Louis Dreyer and driller consult Bethlehem's new Ton-Mile Tables booklet. It tells how to use the ton-mile tables; gives an example of a controlled cut-off program; portrays a rotary drilling rig string-up diagram; shows how to determine length of cut; and contains a pad of service record forms. Write today for your free copy.

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3. Take good care of rope
4. Specify Bethlehem

BBM Drilling Co. runs an efficient, cost-conscious drilling operation. So it isn't surprising that they follow the four golden rules for long wire rope life.

The photograph shows BBM's No. 8 Rig, drilling for Amarillo Oil Co. near Midland, Texas. They were at 7,152 ft in a shale and lime formation, heading for a final depth of 11,500 ft.

The rotary drilling line was 1⅛-in. diam 6x19 Seale, Bethlehem Purple Strand with IWRC. It had been used on 5 other wells, had logged 51,675 ton-miles, and had racked up 43,480 ft of hole. The rope was still in good condition, too. A 700-ft length was left on the reel, so a lot more ton-miles were in store.

If you would like to find out how to get longer life from your rotary drilling line, phone the nearest Bethlehem sales office. A wire rope expert will help you plan a money-saving cut-off program tailored to your exact needs.

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Thermal pollution of water supply looms as major industrial problem

THERMAL POLLUTION caused by excessive use of fresh-water supplies for industrial cooling threatens to become a major problem in the United States by 1970, according to American-Standard industrial division, American Radiator & Standard Sanitary Corp.

Fresh water available for industrial cooling in various parts of the country will be too hot for many industrial processes in less than 10 years. A temperature increase of even 5° can mean an intolerable loss in efficiency. To make up such efficiency losses heat-exchanger equipment based on current water-cooled designs will need larger capacities and dimensions. Consequently, these heat exchangers will carry a considerably higher price tag.

Prospects of thermal pollution and the resultant increase in the cost of heat-exchanger equipment have provided the impetus in the search for improved alternate heat exchanger techniques.

Today, fresh-water-cooled apparatus for industrial cooling is the most economical available. By 1970, it is expected that less than 50% of new heat-exchanger equipment used in cooling will be of the conventional water-cooled type.

Water consumption. Fresh-water consumption for industrial and consumer purposes in the United States today is about 312 billion gallons per day. This is about 60% of total available supply of 515 billion gallons per day.

With the population-growth projection for 1965 set at 235 million, it is expected that 435 billion gallons of water will be consumed in the U. S. per day. This is 90% of the total available water. Although this will not be a problem to some areas of the United States, others are currently experiencing either periodic or chronic shortages.

Industry is now using 40% of the water consumed. This percentage is expected to grow at a considerably greater rate than total water consumption during the next 5 to 10 years. Since almost every industrial application of water results in the increased temperature of water being used, the problem may become one of the lack of usable water for industry because of excessive thermal pollution.

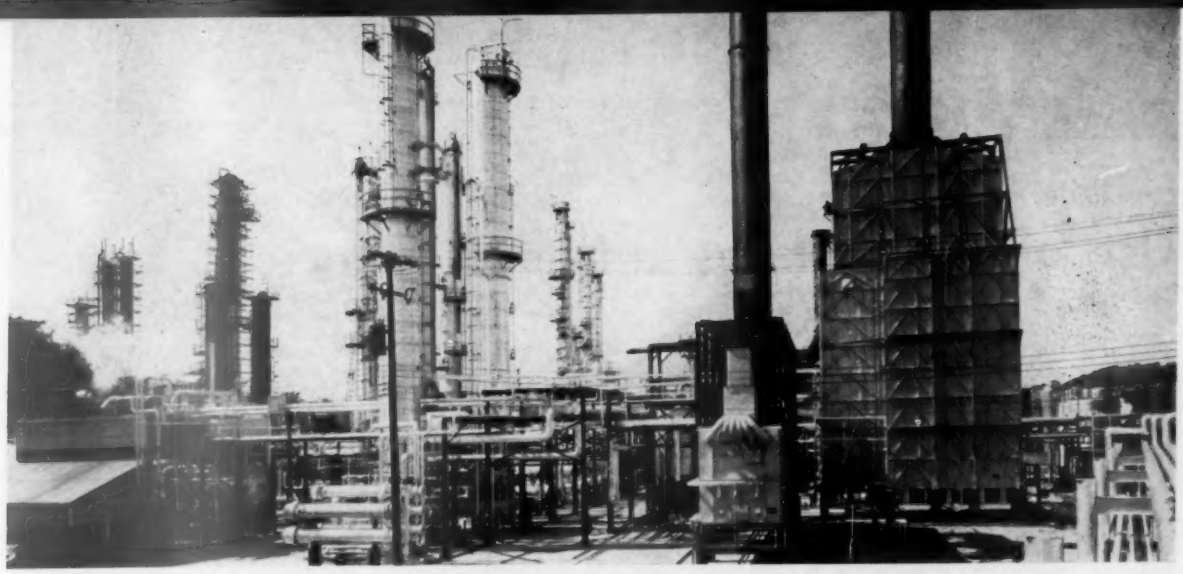
Salt water. The only foreseeable development that may alter this expectation for air cooling would be a major breakthrough in salt-water conversion processes which would make them practical for industrial cooling.

The corrosive properties of salt water, particularly at high temperatures, generally makes direct salt-water cooling impractical. The cost of corrosion resistant materials is prohibitive for most industrial heat exchanger applications.

As another alternative, refrigeration systems may also be used to some degree, although here again cost probably will be the prohibiting factor.

Union Oil adopts stainless piping

FIELD-WELDED stainless-steel manifold piping replaces other piping and tubing at Union Oil Co. of California's Oleum refinery. Need for extensive installation of stainless arose from increased demand for high-quality lubricating oils. Union Oil refinery engineers desired to condition the plant for longer runs between scheduled maintenance shutdowns, reduce further the possibility of equipment failure and of unscheduled shutdown. Reappraisal of materials in use and those available led to stainless steel. The pipe-fabrication job is the largest ever handled by the Oleum refinery shops. Welding is by the inert-gas process, and is followed by 100% radiographic inspection.



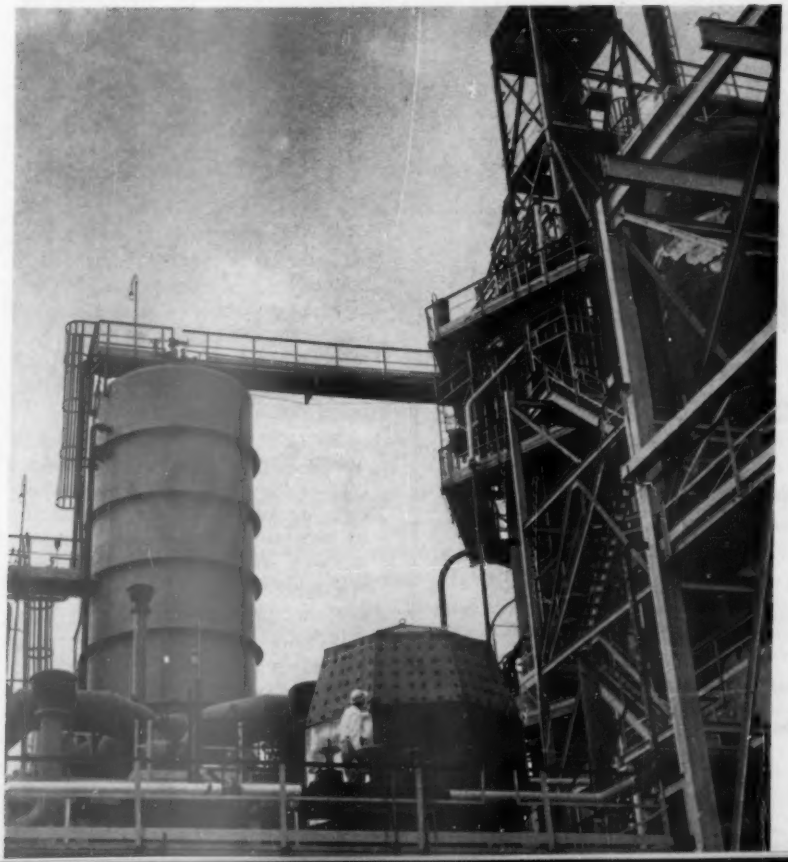
New cat reformer improves Ashlands operating flexibility

THIS recently completed 12,000-bbl. per day catalytic reforming unit at Ashland Oil & Refining Co., Catlettsburg, Ky., went on stream within 10 months after contract award. Included with the unit on two-thirds acre of ground is equipment for fractionation and hydrogen treatment of feed stock, and for reformate stabilization. The reformer ups reforming capacity at Catlettsburg more than 150%.

The reformate products give Ashland greater operating flexibility by providing an increase in output of high-octane motor fuel and a rich feed for a solvent-extraction unit that produces benzene, toluene, and xylene.

The unit was built for Ashland by Blaw-Knox Co., Pittsburgh.

Signal's cat cracker gets the silencer treatment



A NEW AIR INTAKE and exhaust silencer system quiets a noisy cat cracker. Comparison of sound surveys shows over 50% decrease in sound level between before-and-after readings. Signal Oil & Gas Co. installed the new system on its "B" catalytic cracking unit at its Houston refinery.

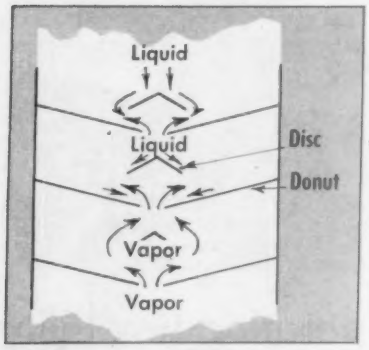
The silencer system is on the regenerator's air intake and exhaust. Air-intake silencer is a polyhedron-shaped dome which is 11 ft. in diameter by 11 ft. high (lower center of photo). Regenerator-outlet silencer is 5 ft. in diameter by 25 ft. high (upper right in photo).

Both silencers include baffles of 3-in.-thick absorbent pads, glass-fiber cloth, stainless wire screen, and perforated 12-gage steel liner.

The silencers were designed and engineered by Texas Research Associates Corp., Austin, Tex. Signal says the silencer system cost about $40,000 which included research, design, manufacture, installation, and temporary down time for installation.

Here is information on

Use of baffle plates in fractionating



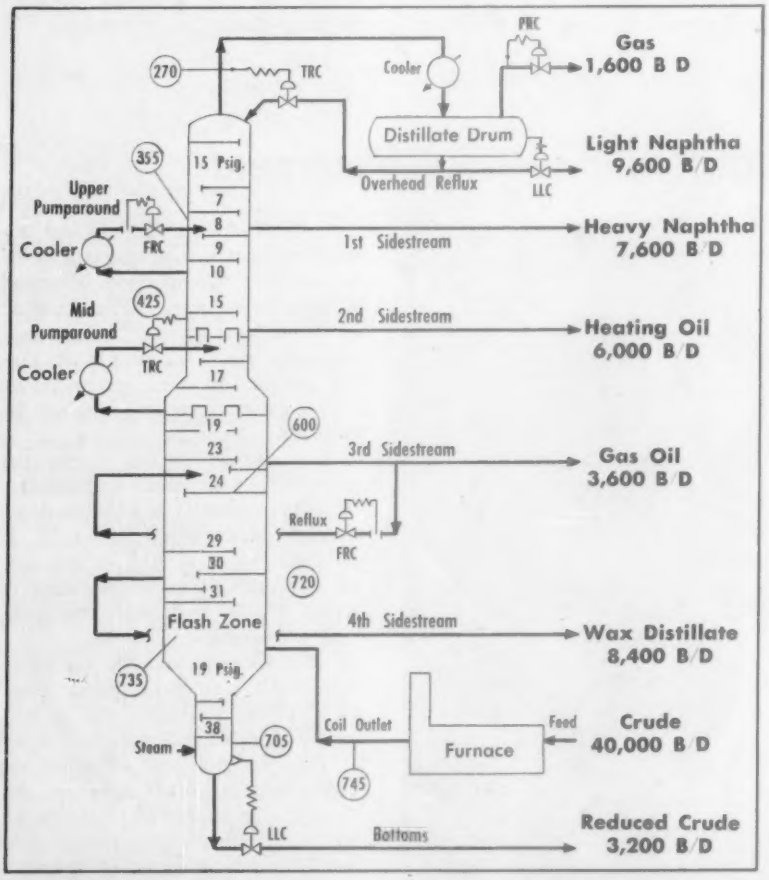
BAFFLE PLATES are used where the liquid and vapor load are extremely high. Fig. 7.

This material taken from process-training-program manual, Bayway, N. J., refinery of Humble Oil & Refining Co.

BAFFLE PLATES as shown in Fig. 7 are usually installed in a tower where the liquid and vapor loadings in the tower are high. When such a condition occurs in a tower, the rising vapor will often physically carry some higher-boiling material up the tower, and contaminate the product streams further up the tower.

Their main advantage is the low-pressure drop which occurs at high vapor-liquid flow rates. High vapor-liquid rates are usually encountered near the bottom of fractionating towers, consequently this is where you usually find baffle plates.

Baffle plates are also used in "dirty," high-temperature service where there may be coking or solids deposits.



PIPE STILL separating crude oil is the most complex of any fractional distillation in the refinery. Temperatures, pressures, and flow rates vary depending upon the type of crude which is being run. Fig. 8.

Summary

The best fractionating tower is the one that will give the desired separation at the minimum cost. While low initial cost is important, low operating and repair costs sometimes more than offset a higher initial cost of equipment.

To be sure of good tower operation, these features must be used in the design:

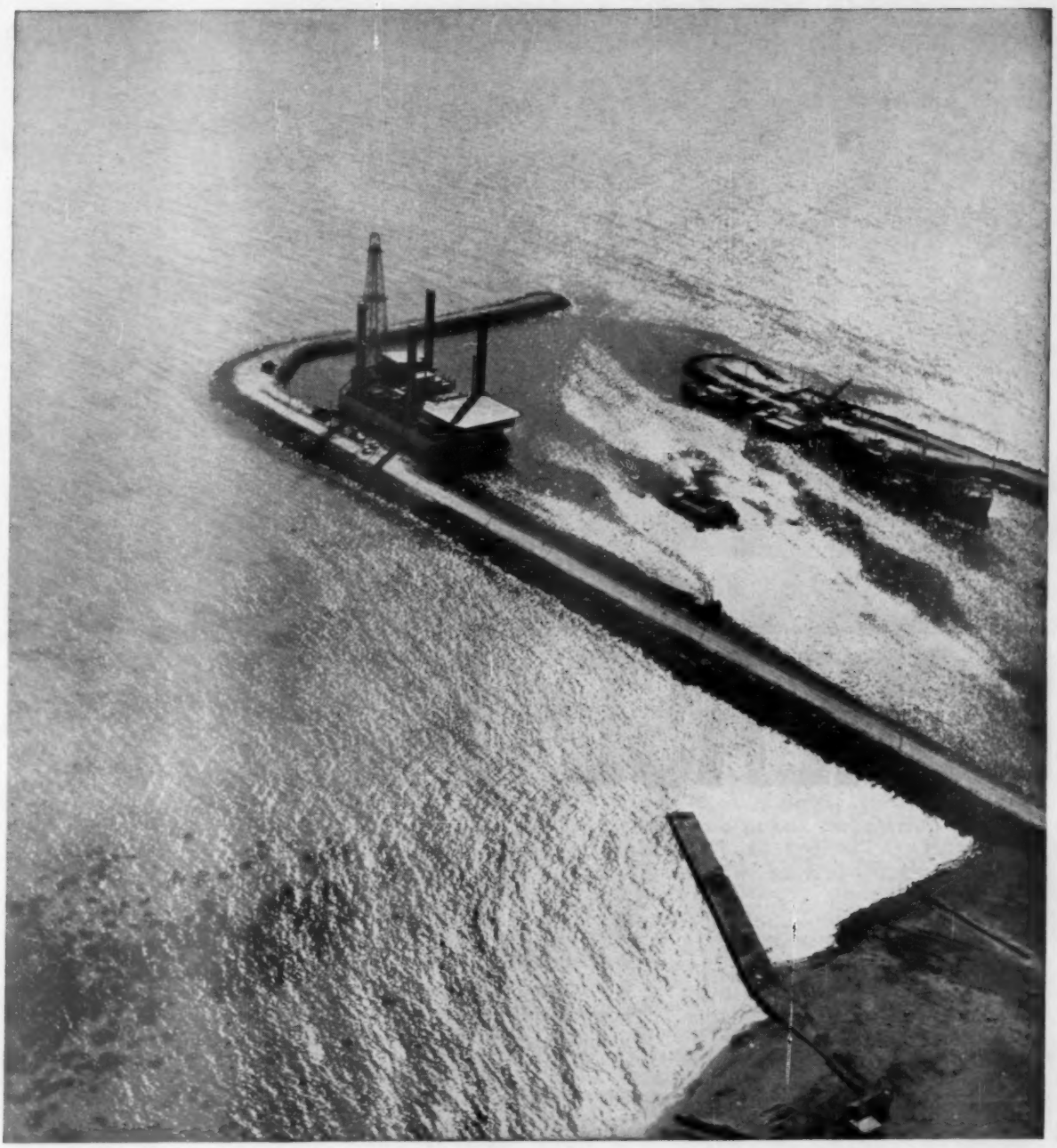
1. Even distribution of vapors.
2. Good contact between vapors and liquid.
3. Proper velocities through the tower to give optimum contact time between vapor and liquid.
4. Good separation of liquid and vapor on each tray.
5. Proper equipment to control tower temperatures, pressures, and rates.

Tower Operation

The operation of a pipe still on a crude-oil feed is the most complex fractional distillation operation we have in the refinery. To illustrate the controls used on a fractionator we will use the operation of a pipe still when running San Joaquin crude.

Remember that there are many types of crude oil, and that different products (sometimes in the same boiling range) are obtained from the different crudes. This means that the temperatures, pressures, and flow rates maintained on a pipe still will vary depending on the type of crude being run.

We are going to illustrate only one such operation. Fig. 8 shows a typical operation. Note that equipment is available on this pipe still to separate the crude feed into six different fractions (excluding gas). An overhead, four side streams, and bottoms product can be cut using this tower. In many fractionating towers in a refinery, only an overhead and bottoms cut are made from the feed.



Shamals by Synoptics*...

THE SHAMAL WINDS – violently unpredictable – could spell sudden disaster for this mobile drilling platform in harbour at Das Island, in the brief, critical period of being moved at sea. But now the bogey of these ancient waters has been countered – by modern meteorology. *Adma Enterprise* with its drilling rig (owned and operated by BP in association with French interests) waits in berth till synoptic weather reports are assembled from the new network of weather stations in Iran, Kuwait, and South-East Arabia. It will proceed only when the "all-clear" is given. British Petroleum has taken a leading part in organising these Weather Reporting Stations. Thus drilling and pipe-laying operations, as well as shipping, now proceed more securely in these deceptive waters.

BP

* *"Synoptic meteorology is a weather-reporting technique based upon the collation and comparison of simultaneous reports from different areas."*

COOPER "TROUBLE-FREE" GEAR AND TORQUE TUBE DRIVE SYSTEMS

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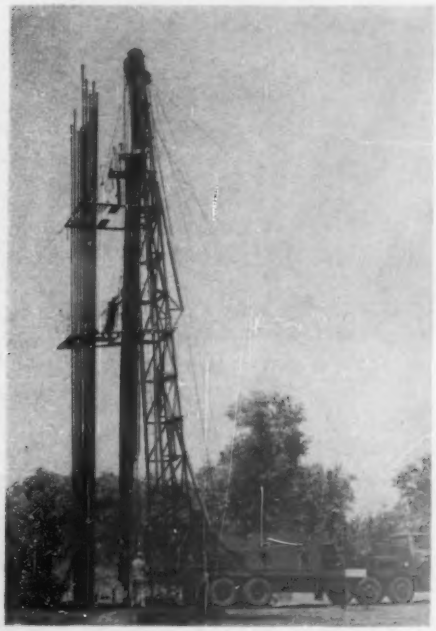

One of the most frequent causes of down time is inefficient, old fashioned drive systems. That's why Fred E. Cooper, Inc., utilizes a modern, trouble-free gear and torque tube drive in every Cooper self-propelled rig. Due to the development and use of this more efficient drive system,* down time has been cut to a minimum . . . there is more power efficiency from the engine to the drum, minimum maintenance** because it has no high speed chains and fewer parts to wear. The Cooper drive system directs the power where it's needed without idling parts.

So, if down time, caused by an outmoded drive system is ruining your profit picture, see your Cooper representative today. There is a complete line of Cooper rigs to choose from for wells of any depth . . . or give us your rig requirements and we'll do the rest.

*"TC" and "TR" Drive Systems — through transmission — Cooper power transfer — Cooper right angle drive and final chain drive to drum — Rated at 91% efficiency.
Authority: Kent's Mechanical Engineers Hand Book. Ratings established through actual tests.

**Recent survey covering 109 "TC" and "TR" rigs, since 1955, showed a total parts sales of $134.49 for both Cooper power transfers and Cooper right angle drives in these rigs.

SINCE 1918 — THERE MUST BE A REASON

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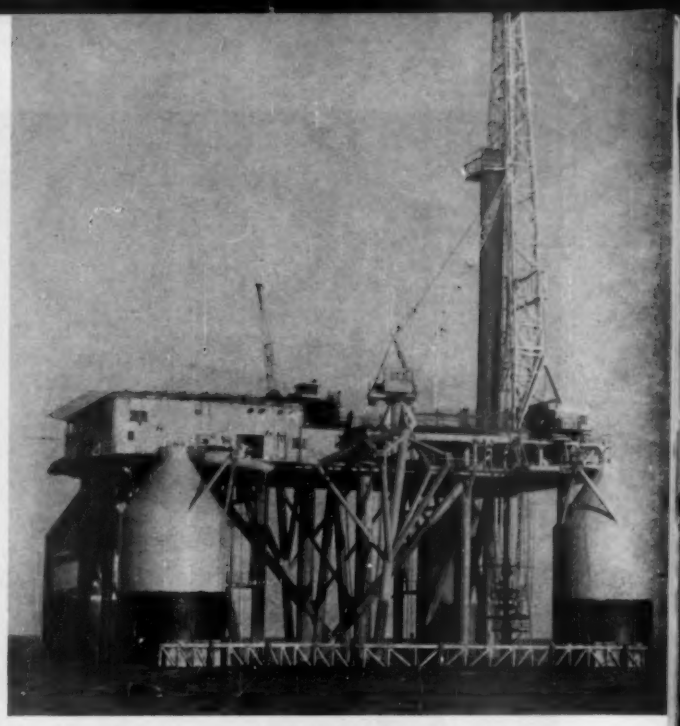
P. O. BOX 1890, TULSA, Okla.

Branches: Houston, Odessa, Olney

BEFORE the bottles were placed on the corners of Coral Drilling's Mr. Arthur, it was fixed-deck submersible unit capable of operating in 60-ft. of water. Lower segments of the "bottles" or "jugs" are shown here being barged to the vessel.



AFTER the reworking, Mr. Arthur drills off the Louisiana coast. Stability provided by the jugs makes it possible for the unit now to drill in as much as 80 ft. of water. Upper and lower hulls remain virtually the same.

Mr. Arthur gets "jugged"

BY ED McGHEE
Drilling Editor

FOUR large-diameter "jugs" have been added to the corners of Coral Drilling Co.'s submersible offshore drilling barge, Mr. Arthur. The vessel is already back at work off the coast of Louisiana.

Purpose of the jugs or bottles is to add stability to the barge when it is under tow, being submerged, or refloated. In addition, the jugs make submerging and refloating faster than before. Coral has also respaced the upper and lower hulls of the vessel so that Mr. Arthur now operates in water 20 ft. deeper than was previously possible.

While other offshore barges have added jugs, few if any have done the job in such a speedy and economical manner. When the time came to elevate the upper deck the added 20 ft. and insert the new jugs, Mr. Arthur supplied its own power. Thus, the amount of outside equipment needed for the job was small considering the magnitude of the job.

Spud piles used. Mr. Arthur was originally built with a number of spud piles which were jacked downward hydraulically from the lower hull. When the unit arrived on a new location, it floated atop the water while these piles were jacked down into the gulf bottom. After these piles were firmly fixed in the bottom, Mr. Arthur submerged, riding the piles downward like a fireman sliding down his pole.

When the vessel was refloated, it rode to the surface on the same piles. Only when Mr. Arthur was safely floating in a stable position were the piles retracted. The piles kept the vessel under control and prevented mishap during the crucial periods when it was neither sitting on bottom nor floating on top of the water.

Jugs added. While the pile method worked well the first several years of the vessel's life, it had neither the simplicity, stability, nor speed of the corner jugs which were a later development. So, when one of the piles became bent and it was necessary to put the craft into port for repairs, Coral's management decided to add the 30-ft. diameter corner jugs at the same time.

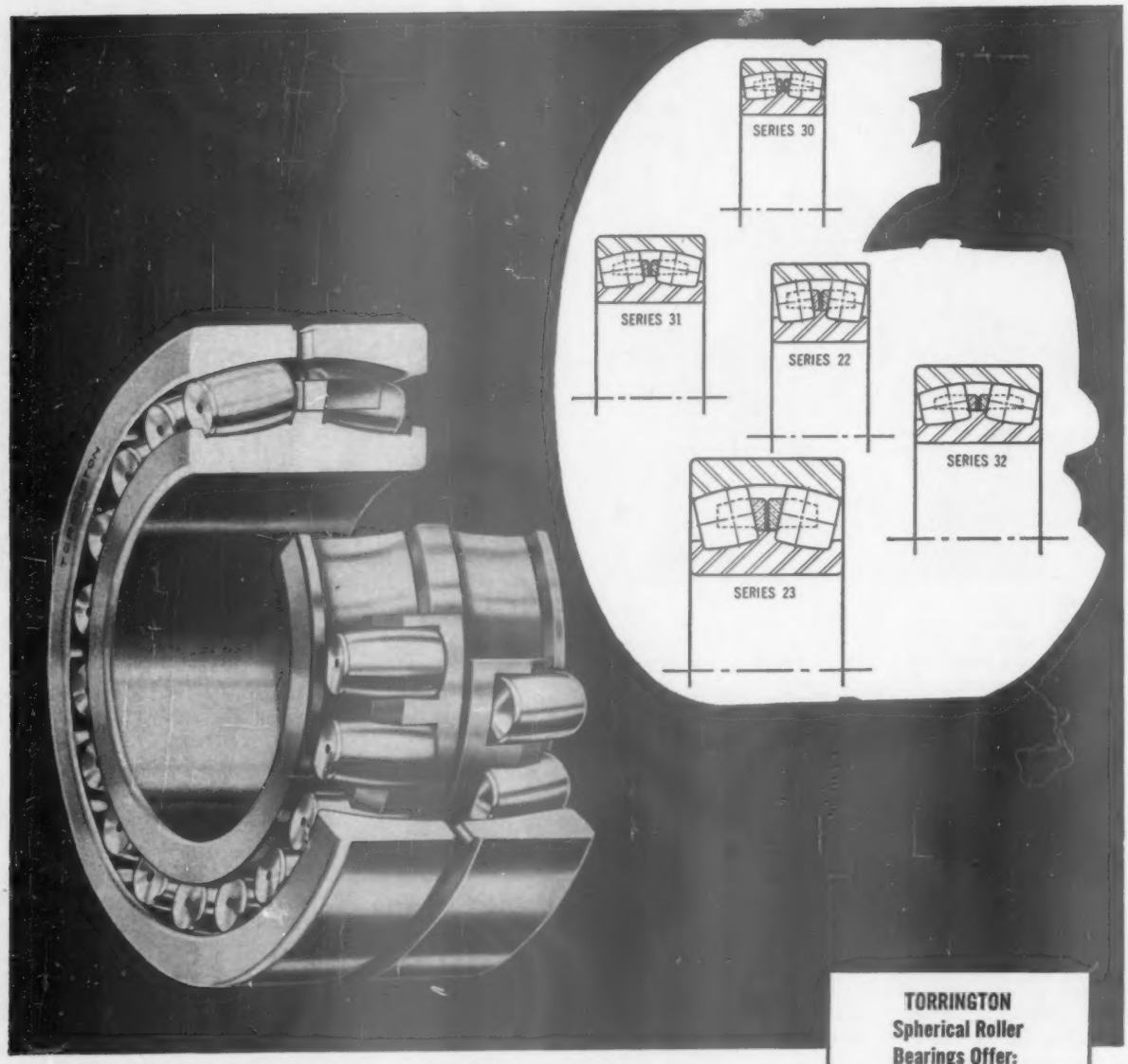
Since the modification was being made anyway, Coral decided to go a step farther: the new jugs were to be made tall enough to enable Mr. Arthur to drill in 80 ft. of water. Originally, the vessel operated in no more than 60 ft.

To respace the hulls meant, of course, that the upper hull would have to be cut loose from the lower and jacked up the extra 20 ft. Here is where the spud-pile jacks came into use.

The piles operated by hydraulic pressure inside the hollow cylinders which supported the upper hull from the lower hull. These cylinders were just above the lower hull, but the piles were left intact inside. The piles were secured against moving downward. Then, when hydraulic pressure was put on top of the spud piles, the upper hull was forced up.

In only 3 hours and 15 minutes of actual jacking time, the upper hull was elevated the necessary 20 ft.

Neither the upper nor lower hulls were changed significantly. About the only other change was to cantilever the cargo cranes over the side of the work deck.



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PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and contractors.

This summary appears in the last issue each month. New projects are reported weekly under Pipeline Briefs.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, natural gas, or miscellaneous.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U. S. Crude Oil Pipelines

CAL-KY PIPELINE CO., Pascagoula, Miss.
Project: 104-mile crude line from Ostrica, La., to proposed refinery at Pascagoula, Miss.
Status: Planned.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
Project: 4-mile, 3-in., 18, 4-in., 68, 6-in., 323, 8-in., and 53, 10-in., Glacier System from Cutbank, Mont., to Byron, Wyo.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: February 1962.

GREAT NORTHERN PIPE LINE CO., 175 East 4th St., St. Paul 1, Minn.
Project: 64-mile extension to the Lignite field, Burke County, North Dakota.
Status: Planned.

MATADOR PIPE LINE CORP., Denver, Colo.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Approved by CNEB.
Completion: Early 1962.

MID-CONTINENT PIPE LINE CO., Tulsa, Okla.
Project: 25-mile, 4-in. line from Muskogee field to Bald Hill Station.
Status: Under way.
Completion: February 1, 1962.

MURPHY CORP. and **PLACID OIL CO.**, Denver.
Project: 22-mile, 4-in. line from Tule Creek field, Montana, to Butte Pipeline. line.
Status: Under way.
Contractor: Oil Field Service.

SHELL PIPE LINE CORP., Box 2648, Houston 1, Tex.
Project: 12-mile, 12-in. line from Pelican Island to Nairn Junction.
Status Under way.
Completion: February 1962.
Contractor: J. Ray McDermott, Inc.

U. S. Products Pipelines

AMERICAN PETROFINA CO., Rockefeller Center, New York, N. Y.
Project: 133-mile, 6-in. line from Mount Pleasant to Dallas-Fort Worth area.
Status: 80-mile section, Greenville to Mount Pleasant, under way.
Contractor: Fowler-Tatom Pipeline Contractor, Inc.

CARL M. LOEB, RHOADES & CO., 42 Wall St., New York 5.
Project: 75-mile, 20-in. from New Jersey refineries to Long Island airports, Idlewild and La Guardia.
Status: Proposed.

CHEROKEE PIPE LINE CO., Bartlesville, Okla.
Project: 225-mile products line, Ponca City, Okla., to Wichita Falls, Tex.
Status: Under way.
Contractors: Williams Brothers, Mitchell Construction.

EL PASO NATURAL GAS CO., El Paso, Tex.
Project: 58-mile, 6 in. LPG line Jal, N. M., plant to El Paso Natural Gas Products Co. refinery, Odessa, Tex.
Status: Planned.

GREAT LAKES PIPE LINE CO., Kansas City, Mo.
Project: Conversion of 6-in. products lines from Des Moines, Iowa, to Minneapolis and to Chicago area to tie-in with Northern Gas Products LPG line from Bushton, Kans.
Status: Planned.

HUMBLE PIPE LINE CO., Box 2220, Houston, Tex.
Project: 270-mile line west from Baytown, 177 miles 8 and 10-in. with 6-in. branches 43 miles to Austin and 50 miles to San Antonio.
Status: 20.6-mile, 10-in. from Clear Lake to Pierce Junction under way.
Contractor: T-T Construction Co.
Completion: April 1, 1962.

LAFITTE OIL TRADERS, INC., Bartlesville, Okla.
★ Project: 7-mile, 6-in., Lake Charles to Dixie LPG line.
Completion: January 1962.

MID-AMERICA PIPELINE CO., 1437 S. Boulder, Tulsa.
Project: 100-mile extension from Ogden to Charles City, Iowa.,
Status: Planned.
Construction: 1962.

NORTHERN GAS PRODUCTS CO., Omaha, Neb.
Project: 350-mile, 8-in. LPG line from Bushton, Kans., plant to Des Moines, Iowa, connecting with Great Lakes 6-in. lines to Twin Cities and to Chicago area.
Status: Planned.

OLYMPIC PIPELINE CO. (proposed)
Project: 94 miles, 16-in.; 162 miles, 11-in., 45 miles, 8-in. and 23 miles, 6-in. from Ferndale and Anacortes, Wash., refineries to Seattle and Portland.
Status: Planned.

POTOMAC PUBLIC SERVICE CO., Arlington. Va.
Project: 80-mile, Baltimore to Washing- airports.
Status: Planned.

SERVICE PIPE LINE CO., Box 1979, Tulsa, Okla.
Project: 24-mile, 4-in. LPG line from Port Acres to Beaumont Junction, Tex.
Status: Under way.
Contractor: Sharman, Allen, Gay & Taylor.

SOUTHERN PACIFIC PIPE LINES INC., San Francisco 5, Calif.
Project: 125-mile, 8-in. from Portland to Albany and Eugene, Ore.
Status: In design stage.
Completion: July 1, 1962.
★ Project: 52-mile, 8-in. from Marysville area to Chico, Calif.
Status: In design stage.
Completion: July 1, 1962.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Project: 6-mile, 8-in., Deer Park to Pasadena, Tex.
Status: Planned.

TEXAS EASTMAN CO., Longview, Texas.
Project: 275 miles, 6-in. LPG line from Sweeney to Longview, Tex.
Status: Under way.
Completion: December, 1961.
Contractor: O. R. Burden Construction Co.

U. S. Natural Gas Pipelines

ALAMO GAS SUPPLY CO., Alamo National Building, San Antonio, Tex.
Project: 166 miles of 20, 22, and 24-in. line and 101 miles of 12, 16, and 24-in. line from Texas Gulf Coast to San Antonio.

AMERICAN LOUISIANA PIPE LINE CO., Detroit, Mich.
Project: 25-mile, 8-in. to connect Holly Ridge field, Tensas Parish, Louisiana, to main line.
Status: Pending FPC approval.

BI-STONE FUEL CO., Corsicana, Tex.
Project: 100-mile, 16-in. main line from Bethel field, Anderson County, to Merit, Hunt County, North Texas, with 75 miles, 10, 8 and 6-in. laterals.
Status: Planned.

BORDER GAS TRANSMISSION CORP. (Lehman Brothers, New York, and Rio Gas Gathering Co., 615 National Bank of Commerce Building, San Antonio 5, Tex.).
Project: Gathering lines in Starr, Zapata, Jim Hogg, Brooks, and Webb counties, Texas.
Status: Proposed.
Project: Gathering lines in Dimmit, Zavala, and La Salle counties, Texas.
Status: Proposed.

COASTAL TRANSMISSION CO., Houston, Tex.
Project: 71 miles laterals in Florida.
Status: Approved by FPC examiner.
★ Project: 75-mile, 3-in. gathering lines in Texas, Louisiana.
Status: Approved.
Completion: June 1, 1962.

COLORADO GAS TRANSMISSION CO., Colorado Springs, Colo.
Project: 250-mile, 20-in. line, from Ignacio-Blanco area, Southwest Colorado, to Walsenburg, Pueblo and Colorado Springs, Colo.
Status: Application before Colorado PUC.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs, Colo.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado; 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver.
Status: Pending FPC approval.
Project: 155 miles of 34-in. from Rock Springs, Wyo., to Provo, Utah, to connect with El Paso's proposed 395-mile line to California.
Status: Approved by FPC.
Completion: 1963.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.

PIPELINE CONSTRUCTION

COLORADO OIL & GAS CORP., Denver, Colo.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

COLUMBIA GULF TRANSMISSION CO., Box 683, Houston 1, Tex.
Project: 132.7 miles, 30-in. loops between Alexandria, La., and Leach, Ky.
Status: Proposed.

EAST TENNESSEE NATURAL GAS CO., Knoxville, Tenn.
Project: 10.1 miles, 4-in. lateral to South Carthage, Tenn., and 13.4 miles, 6-in. lateral to Pleasant Hill, Tenn.
Status: Planned.

EL PASO GAS SUPPLY CO., (subsidiary of El Paso Natural Gas Co., Box 1492, El Paso).
Project: 228-mile, 30-in. line, Live Oak County to Sonora, Sutton County.
Status: Pending FPC approval.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 61.3-mile, 10¾-in. lateral to Bremerton, Wash., to be extended 75 miles to Port Angeles by Natural Gas Transmission Co., El Paso subsidiary.
Status: Before FPC.
Project: 8.2-mile, 34-in. loop on Gallup discharge.
Status: Pending FPC approval.
Project: 14.2-mile, 6⅝-in., South Sawyer to Sinclair plant 29.
Status: Pending FPC approval.
Project: 17 mile, 8⅝-in. from Pacific Gas Transmission 36-in. line to Klamath Falls, Ore.
Status: Pending FPC approval.
Project: 34.2-mile, 20-in. from Puckett line tie-in to Goldsmith plant.
Status: Pending FPC approval.
Project: 23-mile, 20-in. loop on Goldsmith plant-Eunice Plains line.
Status: Pending FPC approval.
Project: 27.5-mile, 34-in. loop on San Juan mainline.
Status: Pending FPC approval.
Project: 118.7-mile, 30-in. Permian-San Juan crossover loop.
Status: Pending FPC approval.
Project: 42.3-mile, 30-in. southern system second loop west of Florida station.
Status: Pending FPC approval.
Project: 210.2-mile, 16-in., Keystone mainline station to El Paso.
Status: Pending FPC approval.
Project: 391.4-mile, 34-in. Thistle, Utah, to California-Nevada border.
Status: Pending FPC approval.

GRAND VALLEY TRANSMISSION CO., Green River, Utah.
Project: 16-mile line from Westover field, Grand County, to El Paso Natural Gas Co. main line.
Status: Approved by FPC.

HUMBLE OIL & REFINING CO., Houston, Tex.
Project: 13.5-mile, 26-in. line from Port Acres to Bridge City, Tex.

MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 20-mile, 20-in., Glenville, W. Va., to New Milton District.
Status: Pending FPC approval.

MICHIGAN WISCONSIN PIPE LINE CO., 500 Griswold St., Detroit, Mich.
Project: 64.5 miles, 4/10-in. Laverne field gathering lines.
Status: Planned.
Completion: Gradually over 1961.
Project: 97 miles, 16/20-in. gas line from Woodward, Okla., area to Greensburg, Kans., compressor station.
Status: Approved by FPC.
Project: 68 miles, 4/10-in. gathering system, Woodward, Okla., area.
Status: Approved by FPC.
Project: 30 miles, 30-in. from Station 10 to Woolfolk station, Wisconsin.
Status: Approved by FPC.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MONTANA-DAKOTA UTILITIES CO., Minneapolis, Minn.
Project: 106-mile, 12-in.; 22-mile, 3-in.; 20-mile, 2-in., Minot to Bismarck, N. D.
Status: Pending FPC approval.
Project: 12-mile, 6-in.; 17-mile, 4-in.; 2-mile, 2-in., Alexander to Watford City, N. D.
Status: Pending FPC approval.
Project: 3-mile, 3-in., lateral to Fryburg, N. D.
Status: Pending FPC approval.
Project: 2-mile, 4-in., lateral to Holly Sugar Corp., Hardin, Mont.
Status: Pending FPC approval.

MONTEREY GAS TRANSMISSION CO., Houston, Tex.
Project: 216-mile, 30-in. from Clear Lake, Tex., to Station No. 9, Columbia Gulf Transmission Co., near Alexandria, La.
Status: Pending FPC approval.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
★ Project: 161.5 miles, 30-in. loops, Gulf Chicago system; 57 miles, 36-in. and 5.5 miles 30-in. loops, Texas Panhandle-Chicago system, and 15 miles, 6-in. laterals in Jim Hogg and Zapata counties, Texas.
Status: Proposed.
Completion: 1962.

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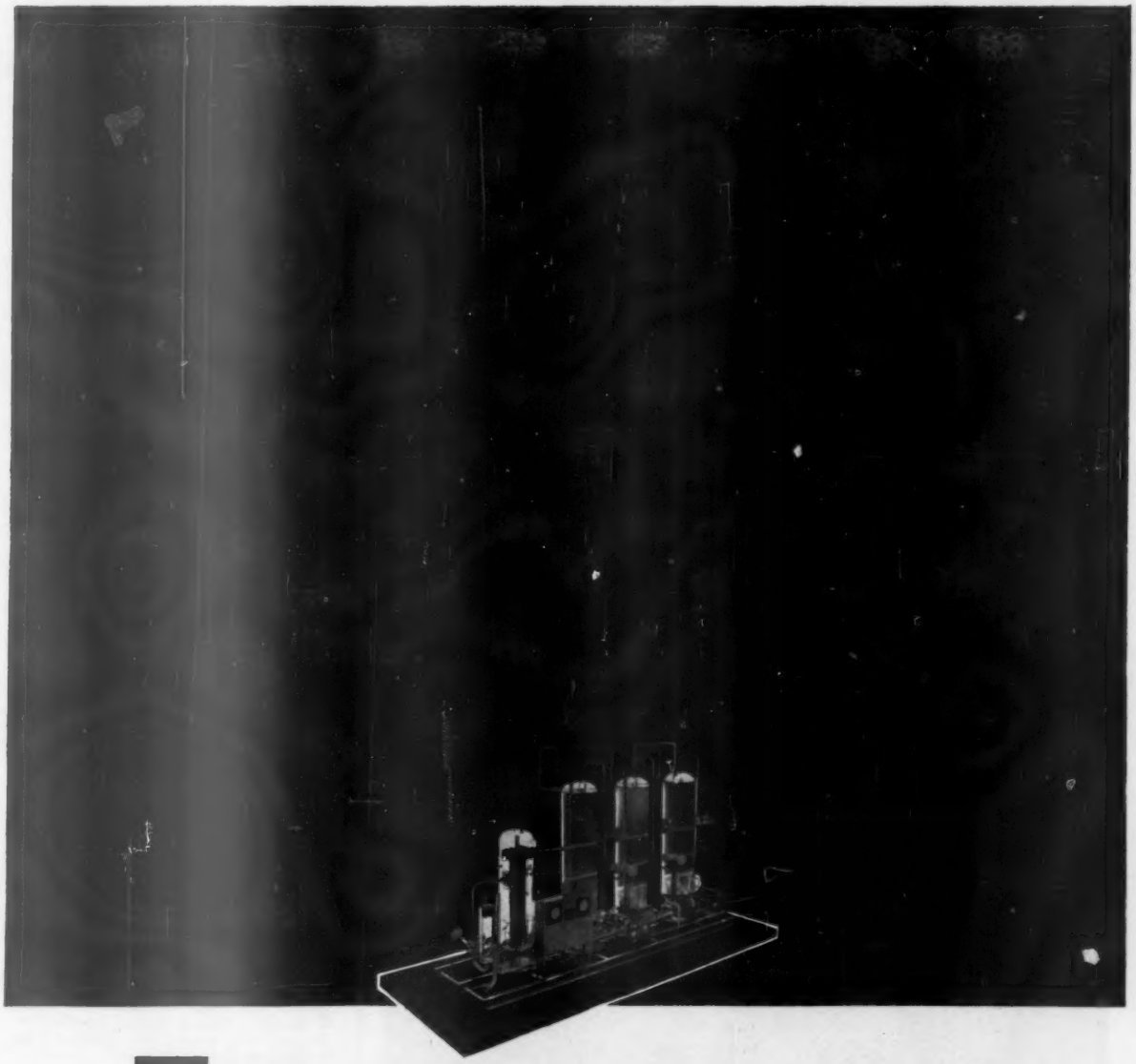

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But desiccant beads soon become saturated with liquid hydrocarbons, and must be reactivated (their captive liquid removed) in order to adsorb more hydrocarbons. Even the largest beds of desiccant become hydrocarbon-saturated in a matter of *minutes* . . . and Parkersburg keeps its beads *active* through complete regeneration as often as every fifteen minutes.

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PIPELINE CONSTRUCTION

NORTHERN NATURAL GAS CO., 2223 Dodge St., Omaha 1, Neb.
Project: 14 miles, 26-in. loop east of Waterloo, Iowa, and 365 miles 2-in. to 16-in. to serve 44 communities in Wisconsin, 17 in Minnesota, 3 in Iowa and one in Nebraska.
Status: Pending FPC approval.
Completion: 1962.

OKLAHOMA-ILLINOIS GAS PIPELINE CO., M. & M. Bldg., Houston 1, Texas. (Joint Fish Engineering Corp., Pan American Petroleum Corp. and Shell Oil Co. venture)
Project: 600-mile, large diameter line from Woodward, Okla., to St. Louis, Mo.
Status: Proposed.

PACIFIC GAS & ELECTRIC CO., 245 Market St., San Francisco, Calif.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1963.

PACIFIC LIGHTING GAS SUPPLY CO., 720 W. Eighth Street, Los Angeles 17, Calif.
Project: 24 miles, 16-in. Gaviota to Goleta, Calif.
Status: Pending California PUC approval.
Completion: Spring, 1962.

PANHANDLE EASTERN PIPE LINE CO., 120 Broadway, New York.
Project: 298 miles of 30-in. loops, 43 miles of 16 to 26-in. supply laterals, and 80 miles of 6 to 12-in. sales laterals.
Status: Pending FPC approval.
Project: 150 miles, 24-in., 50 miles, 22-in. from Elk City, Okla., field to main line.
Status: Approved by FPC.

PIONEER NATURAL GAS CO., Amarillo, Tex.
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex., northward.
Status: Pending FPC approval.

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line near Cornwall, Ont., to Ogdensburg, N. Y.
Status: Approved by FPC.

SOUTHERN CALIFORNIA GAS CO., and SOUTHERN COUNTIES GAS CO. OF CALIFORNIA, Los Angeles, Calif.
Project: 92.9-mile, 34-in., Ivanpah to Newberry, Calif.
Status: Approved by California PUC.
Completion: Jan. 1, 1964.

SOUTHERN NATURAL GAS CO., Birmingham, Ala.
Project: 14.4 miles, 20-in. gas line from Gwinville field to Pickens station.
Status: Pending FPC approval.
Completion: 1962.

SOUTHERN UNION GAS CO., Fidelity Union Tower, Dallas 1, and **EL PASO NATURAL GAS CO.,** Box 1492, El Paso, Tex.
Project: 60-mile line from El Paso's main line near Holbrook, Ariz., to paper mill under construction near Snowflake.
Status: Planned.

TENNESSEE-CALIFORNIA GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 105-mile, 26-in. line from Humble's King Ranch via Kleberg, Brooks and Hidalgo counties to Mexican border to connect with Tennessee-Pemex line to California. Included are 69 miles of 12-in. and smaller laterals.
Status: Pending FPC decision.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
Project: 7.4 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractors: Sam Carline, Inc., laying contractor; Brown & Root, Inc., burying contractor.
Project: 18.5 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: Brown & Root, Inc.
Project: 12.6 miles, 12-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: Brown & Root, Inc.
Project: 20.6 miles, 12-in. gathering line, offshore Louisiana.
Status: Pending FPC approval.
Project: 13 miles, 20-in. gathering line, offshore Louisiana.
Status: Under construction.
Contractor: J. Ray McDermott, Inc.
Project: 6 miles, 12-in. gathering line, offshore Louisiana.
Status: Approved by FPC.
Status: Under construction.
Contractor: Grayco Marine Corp.
★ Project: 58 miles, 20-in. gathering line, offshore Louisiana.
Status: Pending FPC approval.
★ Project: 152 miles, 30-36-in. mainline loop, Ohio, Pennsylvania, New York.
Status: Pending FPC approval.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Project: 45 miles, 30-in. Delmont station, Pa., to Station 26, N. J.
Status: Planned, filed with FPC.
Completion: 1962.
Project: 42 miles, 30-in., Kosciusko station, Miss., to Station 21-A, Pa.
Status: Temporary FPC approval.
Completion: 1962.

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R&M Single Phase Motors are fully weatherized *at no extra cost* . . . can be installed outdoors without cover, and in damp, dusty or corrosive atmospheres. Auxiliary mechanism (at right) is externally mounted (frames 254U and up) beneath weatherproof cover for simple inspection, even while motor is running. Available in Open-Protected frames through 20 HP; Totally-Enclosed Fan-Cooled or Explosion-Proof types through 5 HP. Write today for R&M Bulletin 470-B-OG

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Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

PIPELINE CONSTRUCTION

Project: 13 miles, 14-in. Middlesex County, to Barnardsville, N. J.
Status: Planned, filed with FPC.
Completion: 1962.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 1,100-mile, 30-in. line Texas to California via Mexico (see Foreign).
Project: 292-mile line from the California-Mexican border to Los Angeles to tie in with above-mentioned line.
Status: Tennessee Gas' subsidiary, California Gas Transmission Co., and Southern California Edison Co. have applied to California PUC. Also pending FPC approval.
Project: A line from King Ranch, Texas, to the Mexican border, to connect with proposed line through Mexico to California.
Status: Tennessee Gas subsidiary, Tennessee California Gas Transmission Co., to build and operate the Texas segment.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky.
Project: 35 miles, 30-in. and 21 miles, 26-in. in Tennessee, Mississippi, Arkansas, Louisiana.
Status: Under way.
Contractor: Houston Contracting Co.
Project: 52 miles, 20-in., 16-in. and 8-in. from Bay Round, to Morgan City, La.
Status: Under way.
Contractor: Houston Contracting Co.

TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex.
Project: 189 miles, 36-in. loops: 8 miles, Louisiana; 12 miles, Mississippi; 31 miles, Georgia; 24 miles, South Carolina; 14 miles, North Carolina; 81 miles, Virginia; 19 miles, Maryland; 69 miles, 24-36-in. loops, Pennsylvania; 5 miles, 30-in., Texas, and 4 miles, 30-in., Louisiana.
Status: Pending FPC approval.
Completion: 1962.
Project: 104 miles, 24-in. and under, gas purchases laterals, Louisiana.
Status: Pending FPC approval.
Completion: 1962.

TRANSWESTERN PIPELINE CO., 618 First City National Bank Building, Houston 2, Tex.
Project: Gathering system in West Texas and Oklahoma, approximately 100 miles, 4 to 6 in.
Status: Under way.
Contractor: Sheehan Pipe Line Construction Co.

TRUNKLINE GAS CO., Box 1642, Houston, Tex.
Project: 9.6 miles, 30-in., Longville to Bundick, La.
Status: Pending FPC approval.
Project: 17.5 miles, 30-in., Rayville to Pioneer, La.
Status: Pending FPC approval.
Project: 22.1 miles, 30-in., Senatobia to Byhalia, Miss.
Status: Pending FPC approval.
Project: 21.6 miles, 30-in., Hinkleville, Ky., to Vienna, Ill.
Status: Pending FPC approval.
Project: 27 miles, 10-in., Merryville to Longville, La.
Status: Pending FPC approval.
Contractor: Glaser Construction Co.
Project: 35-mile, 26-in. line, Cow Island to Jennings, La.
Status: Under way.
Contractor: Sharman, Allem, Gay & Taylor Inc.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.
Project: 216-mile, 30-in., from Bayou Sale Junction, St. Mary Parish, to West Monroe Junction, Ouachita Parish, Louisiana.
Status: Temporary FPC authorization.
Completion: First quarter 1962.
Bledsoe Corp.
Contractors: Panama, Inc., and Stanley-
Project: 59.15 miles, 36-in. from Bastian Bay field, Plaquemines Parish, to Lirette Terrebonne Parish, Louisiana.
Status: Temporary FPC authorization.
Completion: First quarter 1962.
Contractor: Panama, Inc.
Project: 5.5-mile 30-in.; 8-mile 24-in. at West New Orleans.
Status: Under way.
Completion: 1962.
Project: 20.5-mile, 24-in. loop, Pensacola lateral, Baldwin County, Alabama.
Status: Under way.
Completion: First quarter 1962.

WASHINGTON GAS LIGHT CO., 1100 H St., NW, Washington 5, D. C.
Project: 16 miles of 24-in. from near Alexandria, Va., to Prince Georges County, Maryland.
Status: Approved by FPC.

U. S. Miscellaneous Pipelines

MONSANTO CHEMICAL CO., 800 North Lindbergh Blvd., St. Louis 66, Mo.
Project: 25-mile lines to move petrochemicals between proposed plant at Chocolate Bayou and Texas City.
Status: Planned.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1, Tex.
Project: 350 miles of 24-in. coal-slurry line to move West Virginia coal to electric companies in Pennsylvania, New York and New Jersey. (Texas Eastern is working jointly with Consolidation Coal Co., Pittsburgh, Pa.)
Status: Proposed.

U. S. DEPARTMENT OF INTERIOR, Washington, D. C.

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Tell us when you intend to change the governor on your equipment. We'll ship a governor like yours but with all the latest improvements. You can quickly install the new unit. Send the old governor to us. The cost — round-trip shipping plus time and material to overhaul your old governor for our exchange stock.

3 EMERGENCY SERVICE

For real emergencies we'll send a man to your plant, with a governor if necessary. Company airplanes are ready to rush men and material to cope with any situation. Emergencies usually can be handled in one day or less.

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Some competent field mechanics, experienced in small parts assembly, overhaul their own governors in the field. Send us the serial number of the unit, tell us what it's controlling and what your troubles are. We'll send instruction and parts bulletins and suggest parts you may need. If you have a number of governors, send your mechanic to our plant for two to four days training. Travel and living expenses are the only costs.

Our experienced and conscientious service men in our plants at Rockford, Illinois, Schiphol, The Netherlands, and Slough, England, have available the finest tools and test equipment to handle your service problems promptly and efficiently. Similar facilities and personnel will soon be available in Tokyo. All governors overhauled in Woodward plants are modernized to include the latest developments in dependable speed control and are covered by a new governor warranty.

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W-105

PIPELINE CONSTRUCTION

Project: 400-mile, 4 to 10-in. crude helium line from Bushton, Kans., to Cliffside storage area near Amarillo, Tex.
Status: Planned.
Contractor: Engineering contract to Williams Brothers Co.

Canadian Crude Oil Pipelines

BLACKFOOT HILLS PIPELINES LTD., Calgary, Alta.
Project: Two 75-mile lines to connect Lloydminster area with Interprovincial Pipe Line at Hardesty with 4.5-mile line to carry condensate from Hardesty for blending with heavy crude.
Status: Proposed.

FEDERATED PIPE LINES LTD., 304 Sixth Ave. West, Calgary, Alta., Canada.
Project: 10 miles, 4½/6⅝-in. gathering lines.
Completion: Indefinite.

HUDSON'S BAY OIL & GAS CO., LTD., 320 7th Ave., Calgary, Alta.
Project: 10 miles, 6-in., Waterton to Pincher Creek, 29.3 miles, 8-in., Pincher Creek to Carway to connect with Glacier system in U. S.
Status: Pending CNEB approval.

HURON PIPELINES, LTD., Calgary, Alta.
★ Project: 600-mile, 4-6-in. products system to serve Central and southern Alberta communities. System would connect Calgary, Edmonton and Bowden, Alta., refineries with Edmonton, Wetaskawin, Ponoka, Red Deer, Bowden, Olds, Calgary, High Riverm Granum and Lethbridge. Proposal includes approximately 320 miles of 4 to 6⅝-in. between Calgary and Edmonton and 115-mile, 4-in. to Hughendon.
Status: Pending Alberta Dept. Mines & Minerals approval.

INTERPROVINCIAL PIPE LINE CO., Edmonton, Alta.
Project: 90-mile, 12-in. lateral, Hamilton, Ont., to Buffalo, N. Y.
Status: Approved by CNEB.
Completion: Early 1962.

MATADOR PIPE LINE CORP., Denver, Colo.
See Matador U. S.

RANGELAND PIPE LINE CO., Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

ROYALITE OIL CO., LTD., Calgary, Alta.
Project: 26.5 mile, 8-in. Jumping Pound and Wildcat Hills absorption plants to Valley Pipe Line near Calgary.
Status: Under way.

TEXACO EXPLORATION CO., Calgary, Alta., Canada.
Project: 22.2 miles 8⅝-in. loop on Rimbey-Westrose section of existing line.
Status: Pending Alberta Conservation Board approval.

TWINING PIPELINE, LTD., Calgary, Alta.
★ Project: 23-mile, 4-in. from Twining field to Britamoil system near Rowley, Alta.
Status: Under way.
Contractor: Banister Construction Co.

Canadian Natural Gas Pipelines

CARTIER GAS CORP. (St. Maurice Gas Inc., and Consumers Gas Co., 19 Toronto St., Toronto.)
Project: Transmission and distribution in eastern townships and through to Quebec City in Quebec Province.
Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary, Alta.
Project: 29 miles, 16-in.; 15 miles, 12-in.; 2½ miles, 6-in.; and 1 mile, 4-in.; near Blueberry, B. C.
Status: Under way.
Contractor: Majestic Contractors Ltd.
Project: 245-mile, 30-in. extension of Westcoast Transmission system from Taylor, B. C., to Fort Nelson.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.
Project: 53 miles of parallel 7-in. reinforced plastic pipe to serve Vancouver Island, B. C.
Status: Approved.
Completion: 1963.

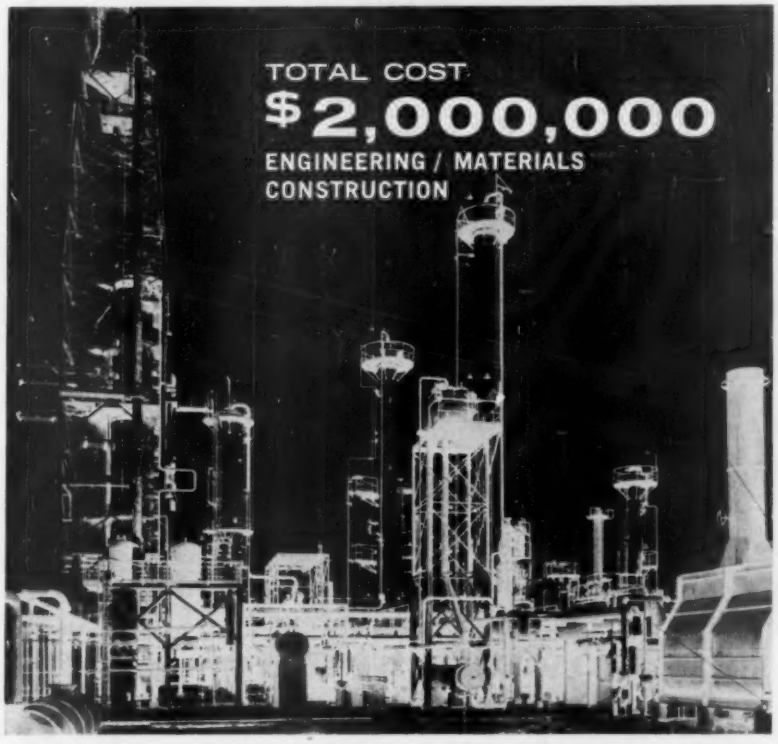
NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.
Project: 110-mile trunk line, plus gathering system, from Las La Biche, in McMurray vicinity, to Edmonton.
Status: Pending provincial approval.

SARATOGA PROCESSING CO., LTD., 406 Petroleum Building, Calgary, Alta.
Project: 67-mile gathering system (43 miles 16-in., 24 miles 4-10-in.) for Coleman, Alta., processing plant.

WESTCOAST TRANSMISSION CO., LTD., Calgary, Alta.
Project: 688-mile, 30-in. loop of British Columbia-Washington line.
Status: Proposed.
Project: (See Alberta Natural Gas Co., Ltd., for joint project.)

Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).
Project: 20 miles of 18-in. from offshore Persian Gulf pool to Das Island.



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PIPELINE CONSTRUCTION

ARABIAN AMERICAN OIL CO., 505 Park Ave., New York 22.
Project: 30-mile, 24-in. Safaniya offshore gathering line.
Status: Under way.
Completion: January 1962.
Project: 27-mile, 24-in. crude line from northern Safaniya to southern Safaniya.
Status: Planned.
Completion: Second quarter 1962.
Contractor: Aramco-Bechtel.

BASRAH PETROLEUM CO., London, England.
Project: 37-mile line from Rumalia field to power plant at Basra.
Status: Contract let.
Completion: March 1962.
Contractor: SAIPEM.

CIE. de RECHERCHE et d'EXPLOITATION PETROLIERE au SHARA, Paris.
Project: 40 miles, 4-8-in. gathering lines, El Adeb Larache field.
Status: Proposed.
Contractor: Socoman.
Completion: January 1962.

COUNCIL FOR MUTUAL ECONOMIC AID (Comecon).
Project: 2,800-mile system from the Volga-Ural oil fields in Russia to East Europe satellite countries.
Status: Construction under way in Poland, Hungary, and Czechoslovakia.

EMPRESA NACIONAL CALVO SOTELO, General Pardenas 55, Madrid, Spain.
Project: 150-mile, 14-in. Malaga to Puertollano.
Status: Planned.
Completion: 1962.

ENI, Milan, Italy.
Project: Central European System, 325 miles, 22-26-in., 300 miles, 14-18-in. from Genoa, Italy, to Aigle, Switzerland, to Ulm, Germany, with branches to Ingolstadt and Stuttgart.
Status: Under way.

ENI-OMV, Vienna, Austria.
(Joint Italian and Austrian state oil agencies venture).
Project: 320-mile line from Trieste to Vienna.
Status: Proposed.

ESSO STANDARD LIBYA, INC., Tripoli, Libya.
Project: 50-mile, 20-in. line to Raguba field from terminus of existing 30-in. line from Zelten to Sirte.
Status: Planned.

IRANIAN OIL EXPLORATION & PRODUCING CO.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO., LTD., 214 Oxford St., London W 1, England.
Project: Looping of Kirkuk-Mediterranean system 66-mile between K-1 and K-2 stations and 81-mile between K-3 toward Syria. In Syria, a 28-mile section of 30-in. is under way.

KUWAIT OIL CO., LTD., Burgan House London, England.
Project: 31-mile, 24-in. crude line from Minagish to Ahmadi South tank farm
Status: Planned.
Completion: Mid-1962.

OASIS OIL CO. OF LIBYA, 1270 Avenue of the Americas, New York 20, N. Y.
Project: 86-mile, 30-in. from Dahra field to El Sider; 36-mile, 20-in. from Mabruk to 30-in. line.

OIL INDIA, LTD., (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government, one-third.)
Project: 720 miles in northeast India, 250 miles of 16-in. from Nahorkatiya to Noonmati and 470 miles of 14-in. from noonmati to Barauni.
Contractors: Mannesmann, Germany, and SAIPEM, Italy.
Status: 16-in. completed, 14-in. section, 1962.

PETROLEO BRASILEIRO S.A. (Brazil)
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Under consideration.
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

RHEIN-DONAU OELETUNG, G.m.b.H., Germany.
Project: Extension of South European Pipeline from Karlsruhe to Ingolstadt.
Status: Proposed.

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.

SOUTH EUROPEAN PIPELINE CO. (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419-mile, 30 in. line from Lavera, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany. This may be extended into lower Batavia with a 155-mile, 22-in. segment.
Status: Under way.
Completion: 1963.

SYRIAN GOVERNMENT, Damascus.
Project: 470-mile, 16-in. crude line from Qarah Shuk field to Mediterranean port.
Status: Proposed.

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PIPELINE CONSTRUCTION

TEIKOKU OIL, Kubiki, Japan.

★ Project: 190 miles, 12½-in., and 20 miles, 20-in. natural gas line from Kubiki to Tokyo.

Status: Under way.

Completion: October 1962.

UNION OF SOVIET SOCIALIST REPUBLICS.

Project: 2,315-mile, 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields, Bashiria, to Irkutsk.

Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES.

Project: 17-mile, 18-in. line from Canadon Leon to Caleta Olivia, Comodoro Rivadavia zone.

Status: Under way.

Project: 15.5-mile, 14- line from Barancas to Lujon de Cuyo refinery, Mendoza zone.

Status: Under way.

Foreign Products Pipelines

INDIA GOVERNMENT.

Projects: 600-mile line from Barauni to Delhi via Kanpur, Lucknow, and Allahabad; 300-mile dual crude and products line from Bombay to Bhusaval; 120-mile products line from Bombay to Poona to be extended 300 miles, later, to Hyderabad; and a 350-mile products line from Cochin to Madras via Bangalore.

Status: Proposed.

NATIONAL IRANIAN OIL CO., Tehran, Iran.

Project: 360 miles of 8-in. from Rey to Meshed, Iran.

Status: Under way.

Contractor: William Brothers, Tulsa.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City, Mexico.

Project: 350-mile, 12-in. Minatitlan to Mexico City.

Status: Planned.

Completion: December 1962.

Project: 270 miles of 8-in. from Torreon to Chihuahua.

Status: Under way.

Completion: February 1962.

PIPELINES OF PUERTO RICO, San Juan.

Project: 95 miles 8-in. from Penuelas to Catano.

Status: Approved by PSC.

SYRIAN PIPELINE.

Project: About 316 miles, 6-in. from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.

Status: Under way.

Completion: 1962.

Contractor: Technit.

UNION OF SOVIET SOCIALIST REPUBLICS.

Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashira to Irkutsk.

Status: Under way.

Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.

Status: Under way.

YACIMIENTOS PETROLIFEROS FISCIALES (Argentina), Buenos Aires.

Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.

Status: Planned.

Foreign Natural Gas Pipelines

BRITISH GAS COUNCIL, London, England.

Project: Pipeline from Canvey Island terminal to Liverpool with branches to Reading and Sheffield to distribute gasified LNG from Sahara.

Status: Proposed.

GAS DEL ESTADO (Argentina), Buenos Aires.

Project: 1,050-mile line from Comodoro Rivadavia to Buenos Aires with a spur ta Plaza Huincul field in Neuquen Province. Line will be 26 in. to Plaza Huincul and 30 in. to Buenos Aires.

Contractor: Saipem-Siderexport.

INTERNATIONAL GAS CO., Los Angeles, Calif.

Project: 1,840-mile, 30-in. gas line from Reynosa to Mexicali via Monterrey, Mazatlan, etc.

Status: Proposed.

ISRAEL GOVERNMENT and private interests.

Project: 75 miles of 16-in. to power a plant at Ashdod Yam on the Mediterranean coast.

Status: Planned.

NATIONAL IRANIAN OIL CO., Teheran, Iran.

Project: 112-mile line from Sarajeh gas field to Teheran.

Status: Planned.

NIOGAS, Vienna, Austria.

Project: 82 miles of 8 and 10-in. to connect Traismauer and Amstetten in Austria.

Contractor: Williams Brothers, Tulsa.

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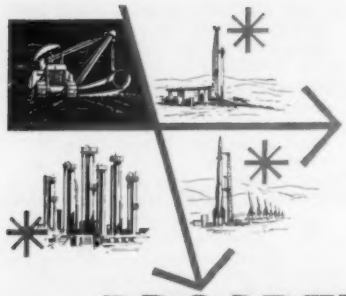

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PIPELINE CONSTRUCTION

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: 1,000-mile system from Sui field to Lyallpur, Lahore, Daudkhel, Islamabad, Rawalpindi, and Wah. This would require a loop to an existing 310-mile 16-in. line from the Pakistan petroleum field to Multan.
Status: Proposed.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

STANDARD-VACUUM OIL CO., New York.
Project: 60 miles of 10-in. from Radja field to Palembang, Sumatra, to supply fertilizer plant planned by the government.
Status: Planned.
Completion: 1962.

SYRIAN LINE.
Project: 316 miles of 6-in. from Homs refinery to Damascus, Aleppo and Latakia.
Status: Under way.
Contractor: Techint, Inc., Miami, Fla.
Completion: Late 1962.

TEIKOKU OIL CO. and **TOKYO GAS CO.**
Project: 200-mile, 12-in. system from Kubiki gas field.
Status: Proposed.

TRINIDAD & TOBAGO ELECTRICITY COMMISSION, Port-of-Spain, Trinidad.
Project: 42-mile, 16-in. gas line from Penal fields to Port-of-Spain.
Status: Planned for 1962.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston, Tex.
Project: 1,100-mile, 30-in. line from Reynosa, to San Luis Rio Colorado, near the California border.
Status: Pending FPC, California PUC approval.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: New line from gas fields in western Ukraine to the Polish border.
Status: USSR has signed agreement with Poland.
Project: 250-mile line from Ust-Vilyuisk field to the Siberian cities of Yakutsk and Pokrovsk, plus feeder lines to supply villages in the Lena River Valley.
Status: Planned.
Completion: Date not set yet.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: From Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: By 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountainsto Serpukhov, south of Moscow, via Rostov and Lugansk.
Status: Under way.
Project: 310 miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.

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Hose buoy aids tanker loading

A LINK between submarine pipelines connected to shore installations and a tanker is provided by a new device, called a Hosbuoy, which is buoyant and floats alongside the tanker to overcome problems created by tide, swells, and drift which accompany nonbuoyant loading facilities. It consists of a superstructure and a lower watertight vessel connected by chains to anchors on the bottom of the sea or harbor.

Water is pumped in and out of the lower vessel to maintain desired buoyancy or to submerge the unit so that working tension is relieved on the anchor chains. This design also provides a means of detaching the unit so it can be moved to another berth or to shore.

The deck is designed for any arrangement of multiple loading arms and submarine hose. Piping manifolds to accommodate single or multiple product pipelines, as well as pipeline displacement systems, may be added. Source: **Garsite Products, Inc.,** 4045 Merrick Rd., Seaford, L. I., N. Y.

Triple-completion tubing head

New features have been incorporated into this Model MCT tubing head for triple completions which include the use of a positive steel-to-steel seal for each tubing string, instead of resilient packing which can deteriorate and bring about the need for packing replacement.

The maker claims the head makes it possible to complete a well with one, two, or three tubing strings without the need to change the tubing head or to use special attachments. All strings can be run independently without the removal of blowout preventors. Too, it is possible to shift from a triple-completion tubing string to a dual or single completion without the need to remove the head or the blowout equipment. Fixed lugs automatically align the hangers without the use of guide pins. Source: **Rector Well Equipment Co.,** Box 1286, Fort Worth, Tex.

Wellhead filter for water-flood use

Such suspended material as iron oxide, scale particles, bacteria, and similar debris can be removed from water-flood injection water at pressures up to 2,000 psi. and at temperatures to 250° F. with this new wellhead filter. Filter cartridges can be replaced without removing the filter from the line, and they can be cleaned and reused. Source: **Hagan Chemicals & Controls, Inc., Oilfield Div.,** Hagan Center, Pittsburgh 30, Pa.

Tank gage mounts two ways

An adaptable mounting on this new Model 2500 Series B tank gage permits it to be mounted either on the bottom of a tank as a conventional ground-reading gage, or at the top of the tank. It can be piped from the top or bottom without the need for modification.

An A-frame bracket supports the gage head apart from the tank in

the conventional mounting as a ground-reading type. The reading position may be either at the front or at the side. The stability provided for the gage by the A-frame bracket is claimed to eliminate errors caused by vertical shifting.

Where continuous lubrication or protection from corrosion is necessary, the gage head and the counter assembly can be filled independently. A circular foam-glass float, jacketed with stainless steel, can be used on fixed or floating-roof tank tops. The gage dial gives readings to 1/16 in. Source: **Varec, Inc.**, 2820 N. Alameda, Compton, Calif.

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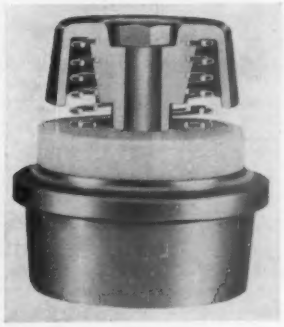


Monel pump-valve assembly

This monel pump-valve assembly is now available for all makes of reciprocating pumps and consists of only five parts: (1) valve seat of nickel copper alloy, flat for convenient resurfacing; (2) valve plate consisting of a flat disk for lightweight yet strong material with two wear surfaces so that the disk may be turned over to obtain a double length of service (3) cylindrical valve spring; (4) one-piece spring retainer to pilot the spring and dampen vibration on each stroke; and (5) monel cap screw with vibration-proof aircraft type of thread lock.

The valves in all sizes may be assembled with dual or single springs to provide the proper spring tension to meet specific pumping conditions. Source: **HB Corp.**, 2706 S. High, Oklahoma City, Okla.

●

New gasoline antioxidants

Two new gasoline antioxidants, both paraphenylenediamine derivatives, have been developed. Type AO-23 is a solution of di-isopropyl paraphenylenediamine in alcohols and is reportedly more active than other previously used derivatives. Type AO-27. diheptal paraphenylenediamine, has a lower degree of activity but is being offered for use in situations where lower toxicity is important. Source: **E. I. du Pont de Nemours & Co.**, Wilmington, Del.

●

Instrument gives fast dew points

Dew-point readings of natural gas can be made both accurately and fast with a new instrument now on the market, called the Dewscope. The maker claims that the instrument eliminates eye shifting during readings, guessing, and broken glass-stem thermometers as the temperature is read directly off a meter that has a thermistor sensing element which senses only the mirror temperature.

A pointer stop has been provided to hold the temperature reading. The range scales can be read at a glance, the maker says. To permit precise readings, an optical light source is used to give clear distinction between hydrocarbon, water, and other dew points. Source: **UGC Instruments**, P. O. Box 1407, Shreveport, La.

Accurate portable moisture monitor

The moisture content of nearly all gases can be monitored with a new coulometric - electrolytic measuring instrument now on the market. The Model 26-303 monitor measures only 11 in. wide, 5½ in. high, and 7½ in. deep. It is equipped with an accurate adjustable flow-control system and a plug-in electrolytic cell which is specific to water and which makes the instrument suitable to monitor nearly all gases, the maker says.

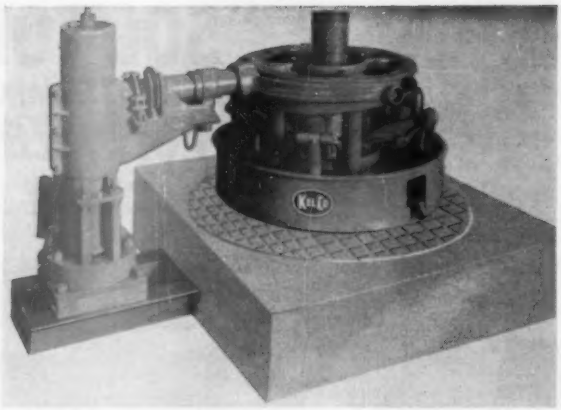
Measurements of trace water in gases from less than 1 to 1,000 p.p.m. by volume can be obtained. Modified models are available that permit 0-to-100 and 0-to-10,000 p.p.m. measurements; and alternate meter scales in pounds per M.M.c.f., milligrams per liter, and parts per million with dew point are available. Source: **Consolidated Electrodynamics Corp.**, 360 Sierra Madre Villa, Pasadena, Calif.

●

Variable-speed mixer drive

Mechanical variable speed drives are now available for a line of portable and fixed mounted mixers. The mixer drives reportedly provide infinitely variable speeds, and up to a 5-to-1 speed ratio. Mixers equipped with the variable-speed drives are expected to prove particularly useful for such conditions as frequent changes in fluid viscosity, varying liquid levels, reduced speeds during tank drainage, pilot-plant studies, multiple-step operations requiring closely controlled agitation, and elimination of splashing and aeration.

Variable speed is achieved through mechanical interaction of adjustable diameter disks and a ribbed belt. Belt replacement can be accomplished quickly and easily without affecting permanent belt alignment. Source: **Mixing Equipment Co., Inc.**, P. O. Box 1370, Rochester 3, N. Y.



Power slips for deep drilling

THIS NEW power slip for deep drilling now available is designed with a lift of only 6½ in. which is claimed to protect the drill pipe and to reduce the required volume of air for operation of the slips compared to slips with higher lift. The slip segments are claimed to be longer than older types of power slips to give more pipe contact. The slips come in three models: J-7 Long, J-6 Standard, and J-6-J Slim-Hole. Source: **Ben F. Kelley Co., Inc.,** 18 S. Madison, Tulsa, Okla.

Drilling control improved

An improved model of the Micromatic drilling control has been brought out, the No. 6-B, which is reported to have a much wider range of operating speeds with accurate control in all areas of any particular speed range than the older No. 6 control.

Like previous models, this one is essentially a speed-governing device which responds to a weight signal from the dead line. It will maintain a predetermined weight on a drilling bit, thus relieving the driller of much physical effort and the need for constant attention.

In the No. 6-B control, a V-belt drive is used between the air motor and the differential-gear unit, instead of the shaft drive used in the older No. 6 control. This permits a choice between a speed range equal to that of the No. 6, two times faster, or one-half as fast, by switching the V-belt from one groove in the sheave to the other, or by transposing the sheaves. Source: **National Supply Div., Armco Steel Corp.,** 2 Gateway Center, Pittsburgh 22, Pa.

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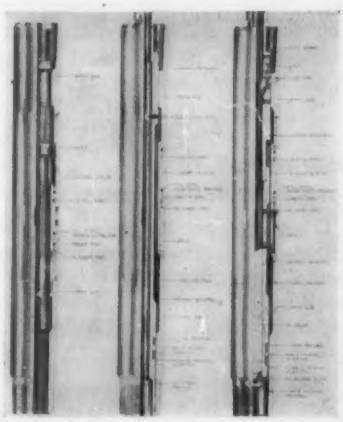

Sleeve for subsurface control

The establishment of communication between tubing or a tubing-casing annulus may be achieved with a new sliding sleeve designed with a large-enough internal diameter to permit passage of perforating guns, pressure bombs, and other tools without disturbing the inner sleeve. All operations with the sliding sleeve are performed with wire-line equipment.

The metal-reinforced packing element will perform satisfactorily when the tool is opened against the well differential pressure existing across the sliding sleeve, the maker says. The critical dimensions of the sleeve are coordinated to selectively land wire-line tools in any three sliding sleeves. Source: **Pressure Services, Inc.,** P. O. Box 13333, Dallas 20, Tex.

●

Instrument finds drill-pipe defects

Defect detectors in a new electronic instrument scan the inside surface of the tube from the tool joint threads to several inches past the upset. An electronic end-area type of inspection instrument, it is designed so that when the detectors encounter a defect, an electronic signal is induced into one of the detectors which is transmitted to the electronic console where it is analyzed, amplified, and recorded in graph form on paper tape for evaluation by the unit operator. The instrument is used in a drill-pipe inspection service now available for inspection of drill-pipe end areas to locate small fatigue cracks and other defects. Source: **Tuboscope Co.,** P. O. Box 808, Houston, Tex.

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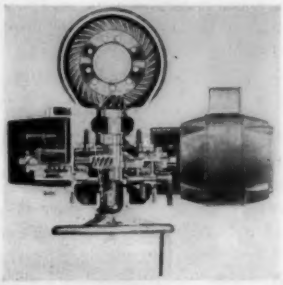

Compact valve operator

Torque is delivered directly to the valve yoke sleeve with this new motor operator for valves, called the Teledyne. According to the maker, the operator is lightweight and compact, yet rugged enough to withstand the most severe and continuous operating conditions, and it eliminates the need for heavy-duty thrust bearings and bulky mounting flanges.

The operator can be applied to

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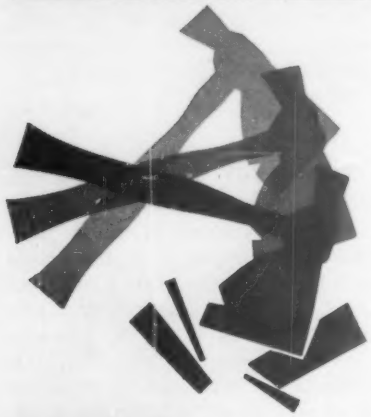

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regular stock valves or to the conversion from manual to motor operation of valves in the field.

It is available with push-button control, or it can be programed for automated operation. Designed to deliver 600 lb.-ft. of torque at the valve yoke sleeve, the motor operator accommodates stem diameters up to 3 in. Source: **Crane Co.,** 4100 S. Kedzie Ave., Chicago 32, Ill.

•

Portable mass flowmeter

Mass flow, total flow rate in cubic feet per hour, and flow direction in gas pipelines operating at pressures to 100 psig. can be determined with this new Model 51A1 portable gas meter.

The hot-wire type of anemometer probe can be inserted into any line through a gate valve. Gas velocity is then indicated by the battery-powered unit. Potential uses include trouble shooting, material balance checks, and routine flow-rate measurements. Source: **Flow Corp.,** 11 Carleton, Cambridge 42, Mass.

•

Instrument to detect hydrocarbons

Trace concentrations of hydrocarbons in the atmosphere, inert gas streams, and other gases can be detected with a highly sensitive hydrogen flame detector which is now available, called the Total Hydrocarbon Analyzer.

Available as a semiportable or panel-mounted model, the instrument is suited for measuring low concentrations of hydrocarbons in a variety of gas streams and for continuously monitoring high-carbon-content input and output streams for methanol converters, reformers, and ammonia converters. the maker says. Source: **Beckman Instruments, Inc.,** 2500 Harbor Blvd., Fullerton, Calif.

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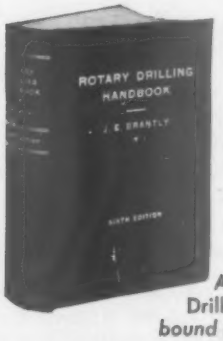

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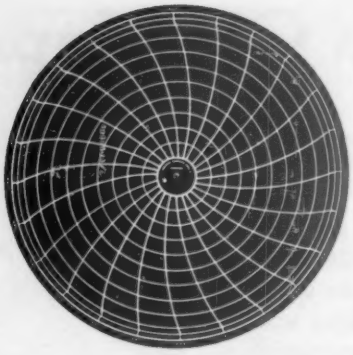

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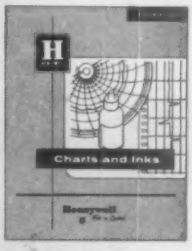

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TRADE LITERATURE

Booklet describes turbine pumps

Vertical pumps for industrial use are detailed in a new 16-page publication now available. The illustrated booklet discusses various types of installation and gives guides on pump selection. Source: **Worthington Corp.,** 426 Worthington Ave., Harrison, N. J.

Recover more flood oil faster

Bulletin 209 describes economic and other advantages of the Orco process for secondary-oil recovery. With this process, carbonated water is forced into the producing formation by simultaneous injection of carbon dioxide and water down each of several wells. Once a flood front of carbonated water has been established throughout the project, noncarbonated water is injected for the remaining life of the flood. The eight-page bulletin includes production data for Orco process applications. It also presents conclusions drawn from case histories that show substantial benefits in net cash gained and reduction in payout time. Source: **Clark Bros. Co.,** Box 560, Olean, N. Y.

Control-valve comparison

This handy booklet compares various features of control-valve construction and operation. In 12-page form, it discusses the problems facing control-valve users and suggests ways in which these problems can be overcome. The booklet covers such subjects as shutoff, maintenance, differences in body construction, and price comparison between two primary types of control-valve design. Source: **Conoflow Corp.,** 2100 Arch St., Philadelphia 3, Pa.

Microwave catalog

This 32-page catalog of microwave instrumentation deals with the generation, transmission, and measurement of microwave phenomena. For convenience in use, the catalog's contents are arranged by frequency range, rather than by model number. The first few pages review basic microwave measurements. Photographs of typical equipment setups for these measurements appear throughout. Source: **Hewlett - Packard Co.,** 1501 Page Mill Rd., Palo Alto, Calif.

High-pressure rotary meter

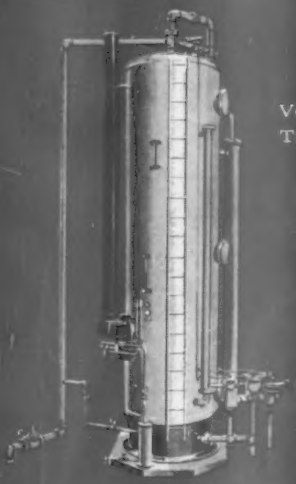
A new 2-in. high-pressure flowmeter, designed for both liquid and gas applications, is the subject of a new catalog sheet just issued. It presents design and construction features, connections and dimensions, pressure-drop charts, and ordering information. The literature describes the flowmeter's vortex-velocity principle of operation, along with specific advantages and recommended applications for both liquid and gas models. Source: **Rotron Controls Div., Rotron Mfg. Co., Inc.,** Woodstock, N. Y.

Lessen control-valve noise

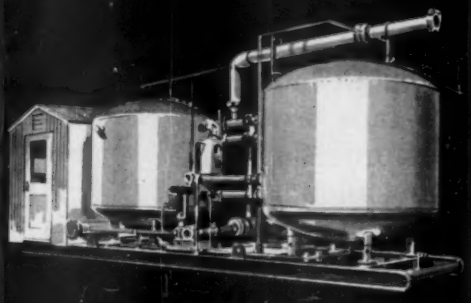
Manual TM-9 is a presentation of the noise problem emitted by control valves and explains how sonic vibration can be damaging to equipment as well as annoying to personnel. Observations in the eight-page publication are drawn from actual high-pressure-reduction applications involving water, natural gas, and steam. It shows that proper treatment will greatly reduce the symptoms, and in some cases, eliminate them completely. Source: **Fisher Governor Co.,** 1700 Fisher Bldg., Marshalltown, Iowa.

Logging of empty holes

Use of the Gamma Gamma density log in the logging of cable-tool or gas-drilled wells is described in a new literature piece, obtainable upon request. The density logging tool has been designed so that its response depends on electron density in the formation rather than on the nature of the atoms. According to the literature, a beam of gamma rays is directed into the formation from a source in the tool. Formations of high density absorb large numbers of gamma rays; formations of low density allow greater numbers of gamma rays to return to the detector in the tool. The log is therefore a measure of formation density. Source: **Schlumberger Well Surveying Corp.,** Box 2175, Houston, Tex.



Vertical Treater



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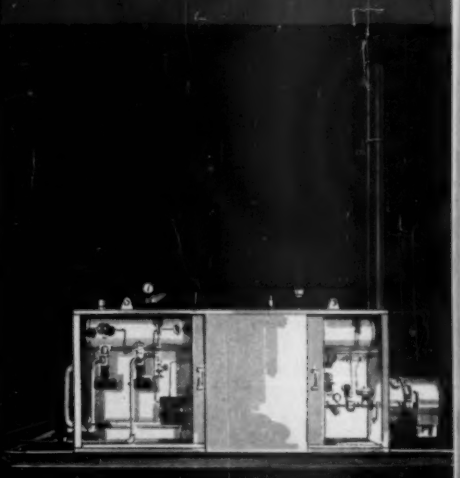
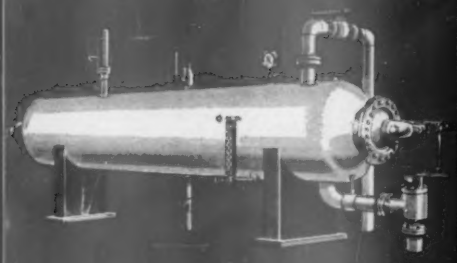


Enclosed Free-O-Freez



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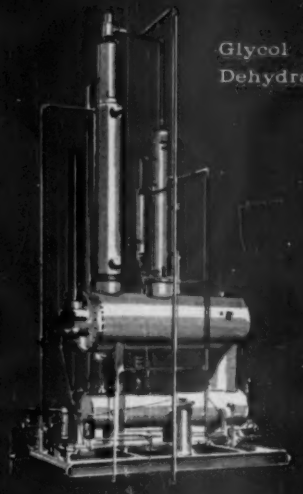

Glycol Dehydrator

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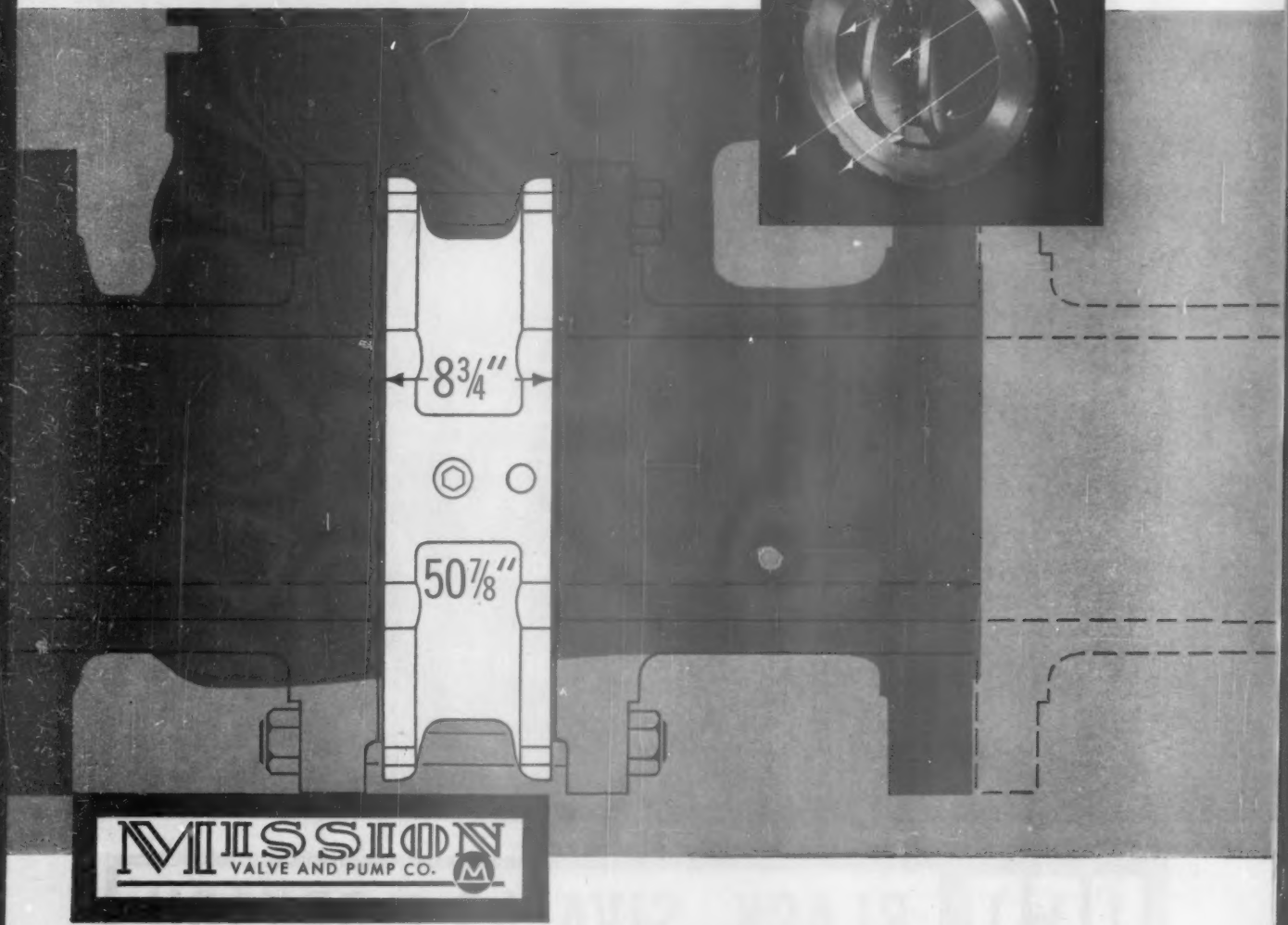
The illustration compares a 10-inch Duo-Chek Check Valve with a conventional check valve. In one application a 10-inch, Series 2500, Duo-Chek, which meets all ASA strength and design requirements except face-to-face size, is in continuous operation on a reciprocating compressor discharge line. A conventional swing check in this service would weigh over 5,000 pounds. The Duo-Chek weighs 285 pounds.

Here are some more quick facts: Available in sizes from 2 to 48 inches, ASA series 125 through 2500, in steel, stainless, aluminum, and bronze. Corrosion and heat resistant seals available. To find out more about these NO-Slam, easy-to-install, easy-to-maintain valves, write Mission today. Your competitors are already saving with them.

Mission Duo-Chek weighs less than 10% as much



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EQUIPMENT MEN

Atlas Bradford Co. appoints pair

Alfred A. Dula has been named general manager of manufacturing, and Terry J. Merritt chief engineer of Atlas Bradford Co., Houston, according to Donald W. Mackie, Jr., company president. Dula formerly was superintendent of manufacturing of Hardy-Griffin Engineering Corp. before it became part of Atlas Bradford. Merritt goes to Atlas Bradford from Commonwealth Services, an engineering and management-consulting firm.

Shields Supply formed in Tulsa

John S. Shields has established Shields Supply Co. at 1009 S. Main St., in Tulsa. The company will stock Chicago Pneumatic Tool Co.'s air tools, electric tools, and repair parts for the Oklahoma and western Arkansas area.

Shields will handle sales of stationary air compressors to the oil industry and manufacturing plants in the area. Other accounts presently represented by the company include Arrow Tools, Inc., Sasgen Derrick Co., Quincy Compressor Co., and B. E. Wallace Products Co.

SYMBOLIZING THE MERGER of National Pipe Testers, Inc., into Lynes, Inc., Bob Leary, of Lynes, stands by the National sign while Bill Crowl, president of National, stands with the Lynes trademark. National Pipe Testers has been carrying out hydrostatic pressure testing of pipe for the past 3 years. The company pioneered the use of Lynes' inflatable sealing elements for this purpose. National's equipment and personnel will be incorporated into Lynes Midland, Tex., district operations in the near future.

NEW HOUSTON ENGINEERING AND RESEARCH LAB of Baker Oil Tools, Inc., contains this packer hot-test, witnessed through the hot-test cell observation window by (from left) H. H. Fisher, chief research engineer; J. D. Keithahn, chief product engineer; L. R. Bradshaw, lab technician; and W. S. Althouse, Baker's manager of engineering and research. The 9,000-sq. ft. engineering and research laboratory, erected on the site of the company's Houston manufacturing plant, includes a completely equipped 1,000-ft. test well, three hot-test cells, pressure equipment, test fixtures, and recording and measuring apparatus that will extend the company's ability to accurately simulate current and future field-operating conditions.

Bethlehem Steel's Tulsa plant to cease operations Dec. 31

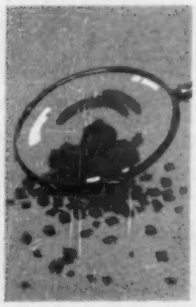
C. R. Zimmerman, vice president of the Supply Division, also announced that the Steelworkers Union had been notified of the shutdown and that management will work closely with the Union as to personnel problems involved. The plant has been sold to Luria Industrial Division of Luria Brothers & Co., Inc., of New York. The decision to close was brought about by a diminishing market for the plant's products and other factors, including higher labor rates than those being paid at similar plants in the area, making the plant noncompetitive.

Lufkin Foundry & Machine Co., of Lufkin, Tex., will manufacture Bethlehem-designed pumping units and general-purpose pumps at its plants. Bethlehem will continue as a supplier of these products through its Supply Division stores. Lufkin will also manufacture spare parts for all Bethlehem pumping units and general-purpose pumps now in service.

Bethlehem's Supply Division will now become strictly a merchandising organization. The stores will handle a full line of Bethlehem oilfield products, including pipe, wire rope, sucker rods, pumping units, and general-purpose pumps. The

4 REASONS WHY MILK EMULSIONS PROVIDE BETTER GEOLOGICAL DATA...

Analysis of cuttings and cores from wells drilled with milk emulsion is easier. Logs are read and interpreted without difficulty.

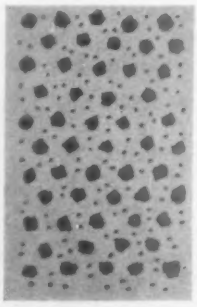


1. Larger Cuttings--

Milk emulsion drilling produces cuttings that are much larger than those produced when drilling with comparable viscosity drilling fluids or even clear water . . . considerably larger than those produced with sample muds. Because they are oil coated, large samples drop from the system in the mud pits and are not recirculated and reground. Result —better geological data.

2. Less Hydration--

Cuttings are protected with a thin oil film, which helps keep them whole until they reach the surface. The oil plating of both cuttings and cores reduces hydration and prevents disintegration. Thus far better quality cuttings are obtained which are not contaminated by the drilling fluid. Result — better geological data.



What are Milk Emulsions?

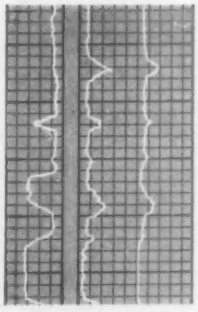
Milk emulsions are low-solids drilling fluids—water containing 5% oil and an emulsifier such as Trimulso, Drilling Milk or Atlosol.

3. Good Oil Shows--

Oil plating from the emulsion does not invade the sample and can be removed easily with any good detergent. Also, oil in the emulsion exhibits a different fluorescence from that of the crude found in the formation so that oil shows are easily identified. Result—better geological data.

4. Logs Not Affected--

The resistivity of any milk emulsion usually equals the resistivity of the corresponding water-base mud. No special compensating factor is required. Resulting logs are easily read and interpreted. Result—better geological data.



In addition to better geological data, other benefits of using emulsions made with Atlas emulsifier include faster penetration, lower costs and better hole condition.

Atlas emulsifier is sold through distributors under the following tradenames . . . each is the product of Aquaness Department, Atlas Chemical Industries, Inc:

TRIMULSO® distributed by Baroid Division, National Lead Company.

Registered trademark Baroid Division, National Lead Company.

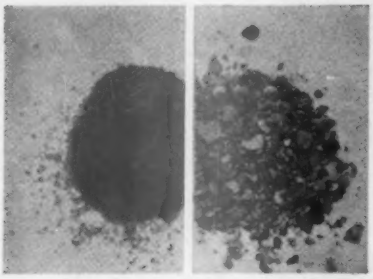
DRILLING MILK® distributed by Magnet Cove Barium Corporation.

Registered trademark Magnet Cove Barium Corporation.

ATLOSOL® distributed by Milwhite Mud Sales Company and other selected mud companies.

Registered trademark Atlas Chemical Industries, Inc.

Aquaness
DEPARTMENT
ATLAS CHEMICAL INDUSTRIES, INC



Comparison of samples recovered when drilling with water (left) and milk emulsion (right) as the drilling fluid.

Consulting Geologist Prefers Samples From Wells Drilled With Milk Emulsion

Cuttings obtained with milk emulsion drilling fluids are much larger, providing better samples for analysis. Bob Zinke, geologist working for Santiago Oil and Gas Company, states, "Fluorescence of the oil film on cuttings from emulsion-drilled wells seldom interferes with oil shows from the formation . . . use of non-fluorescent oil in the emulsion completely eliminates the problem." If preferred, simply washing the cuttings in any good detergent will remove the oil-plating and avoid any possible masking effect.

Standard electrical logs are as easily read and interpreted when run in milk emulsions as when run in conventional muds. According to oil field service company, Lane-Wells, "Resistivity readings are essentially the same for milk emulsions and the corresponding water-base muds."

Ask the Aquaness drilling specialist for complete information on all the benefits of Atlas milk emulsion drilling. His case histories show how Atlas milk emulsions have contributed to better wells, drilled faster with substantial savings in over-all costs.

stores will also sell Ajax engines and compressors and equipment for intensified activity in water-flood and secondary-recovery projects.

Jack Bache, Jr. is appointed C-E advertising supervisor

Jack Bache, Jr.

Jack Bache, Jr., is the newly appointed advertising supervisor for Continental-Emsco Co., oilfield manufacturing and supply division of Youngstown Sheet & Tube Co., according to T. H. Fraser, manager of sales promotion, advertising and public relations for the Dallas-based company.

Bache will supervise and coordinate all company advertising and public-relations programs. He will work with Continental's advertising agency on the production and placement of advertising for all media, as well as selection of media, market research, and public-relations programs. Bache joined C-E in March 1960 as an advertising assistant.

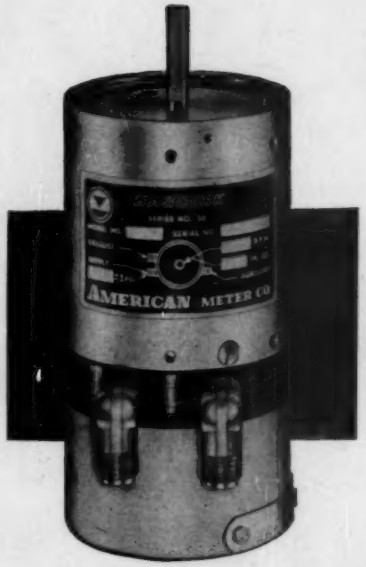
Company to handle marketing problems of small manufacturers

The organization of Tek-Mark, Inc., of 190 Rivervale Rd., Rivervale, N. J., as a marketing service to smaller manufacturers in the instrument and fluid-component field has been announced by Earl B. Hitchcock, president of the new company. Hitchcock resigned his position as marketing director at Hoke, Inc., Cresskill, N. J., in September to found Tek-Mark.

The company is equipped to perform marketing services for its clients or to act as consultants with emphasis on sales organization and promotion for the small manufacturer. Contracts have already been signed with several manufacturers.

Fluid Packed Pump appoints export sales representative

Verlan Lewis has become export sales representative for Fluid Packed Pump, Armco Steel Corp. He will make headquarters in the Houston office of National Supply Division, export department. Lewis



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POWER

DRIVE

Completely self-contained gas or air-powered instrument driving and timing unit for long, trouble-free operation in remote locations. The GASCLOK delivers more than 20 times the torque of conventional spring-wound mechanisms. Continuous timing accuracy is unaffected by a ± 20% variation in supply pressure.

Inherently explosion proof and self-starting, the GASCLOK is ideal as original or replacement equipment for strip chart and conventional circular chart instruments. The timing mechanism is internally sealed to prevent corrosion, and all power unit parts exposed to gas are aluminum or stainless steel. Large area internal ports prevent clogging. Normal air or gas consumption 5 cfh . . . operating pressure 5 psi . . . rotation 2 rpm.

AMERICAN METER CO. EST. 1836

AMERICAN®
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INCORPORATED (ESTABLISHED 1836)

Executive Offices: Philadelphia 16, Pa.
Sales offices in principal cities.

How To Get More Jobs . . .

own the Drive-in Rambler

Satisfied customers have found the Drive-In Rambler works steadily when their other type equipment is idle. When you own a Drive-In Rambler, you too will find producers ask for this particular rig.

ON THE ROAD

On highway and rougher lease roads Ramblers feature the needed reserve power for hills and traffic. Power steering to all front wheels and power shift transmission mean driver maneuvering ease. Ideco engineering offers you a custom designed chassis with proper weight distribution for improved mobility, longer rig life, and reduced over-all maintenance.

RIGGING UP

This rig drives directly up to the wellhead and the driver positions the rig as easily and quickly as you drive into your garage — no loss of time in spotting.

In a matter of minutes the mast is hydraulically tilted and telescoped and ready for work.

ON THE JOB

The drawworks is a time proved Ideco Hydrair, combining the flexibility of torque converter drive and air clutches for maximum performance. Use of the Ideco Dual Speed System in handling pipe with the Drive-In Rambler reduces round trip time 30 to 40 per cent as proved in the field.

RIG DOWN

When the job is completed the mast is quickly telescoped, lowered to road position and ready to move without disassembly.

Call the Ideco man nearest you for full details on this winning combination — Ideco Drive-In Rambler and Dual Speed System.

IDECO

Division of Dresser Industries, Inc. • P. O. Box 1331, Dallas 21, Texas

joined Fluid Packed Pump in 1951 after several years' experience in selling general oil-field supplies. He was promoted to district manager in 1958 and, for the past year, has been specializing in hydraulic-pumping-systems sales in the Gulf Coast area.

Zapata Off-Shore Co. acquires part of National Tube Coating

George H. W. Bush, president of Zapata Off-Shore Co., has announced the acquisition of controlling interest in National Tube Coating, Inc., located at Beaumont. The company has been reorganized with

Joe Safford

Harold Smith

Joe Safford as president and Harold Smith as his assistant, and has been renamed Zapata Lining Corp. The company has sales offices in Houston and an office and plant in Beaumont.

Safford previously was vice president and general manager of Hardy-Griffin Engineering Corp. and of Universal Inspection & Service Co., both divisions of Atlas Bradford Co. Prior to that he was sales manager for Mannesmann Tube Co., Ltd., of Canada. Smith had also been with the Atlas Bradford divisions as assistant inside sales manager. He also spent 13 years with Pan American Petroleum Corp.

Republic Supply names Amsden

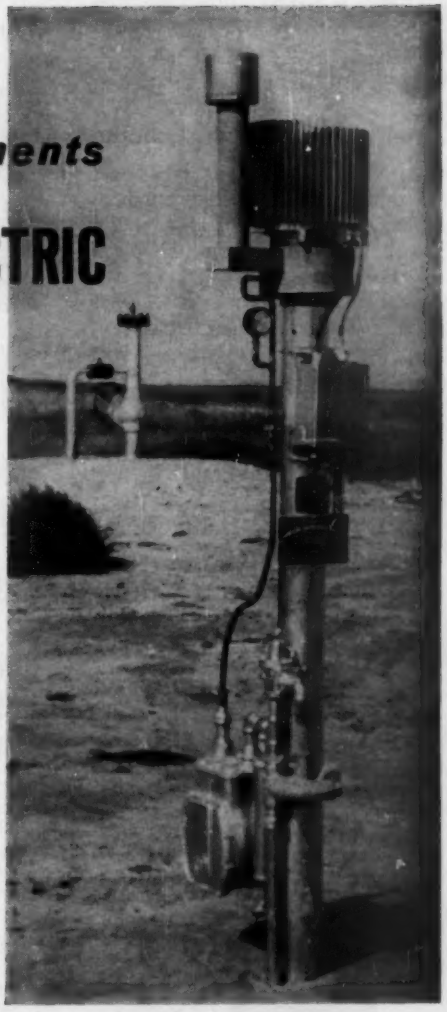
M. N. Amsden

W. J. McWilliams, president of Republic Supply Co., has announced the appointment of M. N. (Blondie) Amsden as resident vice president in Houston. Amsden, a 31-year veteran with Republic, served for many years as district manager at Corpus Christi and Wichita Falls, and in 1953 was transferred to

Texas Instruments

THERMOELECTRIC POWER GENERATOR

. . . Proved in Hugoton Field



In the Hugoton Field, near Ulysses, Kansas, a Texas Instruments 8-watt Thermoelectric Generator, installed by Cathodic Protection Service of Houston, is being used to protect well casing from electrolytic corrosion. In this area, where the cost of bringing in commercial power to each well would be prohibitive, well gas is used as the fuel . . . heat is converted directly to electric power by the Thermoelectric Generator. Since its installation earlier this year, capacity of the unit has consistently exceeded the current required.

Texas Instruments Thermoelectric Generators provide an economical, maintenance-free power source for operating unattended, remotely located equipment such as automatic controls, telemetry equipment, cathodic protection, and emergency power. Long-term reliability is assured by the rugged construction and simplicity of the "no-moving-parts" design. Operation is not impaired by full exposure to the elements . . . winds up to 100 mph have not interrupted test operations.

Write for complete information.

APPARATUS DIVISION
PLANTS IN HOUSTON AND DALLAS, TEXAS

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481

Oklahoma City as general manager of sales. He was named a vice president in 1954.

Dowell transfers M. W. Osborne

M. W. Osborne will take over new duties as district sales engineer at the Amarillo, Tex., district for Dowell Division of Dow Chemical Co. For the past 5 years he was general sales engineer at the Dallas office. Osborne joined Dowell in 1952 as a junior service engineer at Wichita Falls, Tex.

Camco, Ltd. promotes McQueen to vice prexy, managing director

Camco, Ltd., Canada, with headquarters in Edmonton, Alta., has promoted Robert W. McQueen from director of sales to vice president and managing director. McQueen joined Camco in 1956 after 6 years with Imperial Oil, Ltd., and 2 years with T. G. Eastland Testers, Ltd. Camco supplies gas-lift equipment, subsurface production and service tools, and wireline well service from sales-service districts in Edmonton, Calgary, and Swan Hills, Alta., and Fort St. John, B. C.

Peerless Pump names Olson to district-manager position

N. C. Olson

The promotion of Norman C. Olson to district manager of the Peerless Pump southwestern district has been announced by Everett W. Lundy, general sales manager of Peerless Pump, Hydrodynamics Division, FMC Corp. Olson, who has been product sales manager with headquarters at Peerless' Indianapolis works, succeeds William E. Griffin, who is being transferred to the home office in Los Angeles.

Olson previously held the position of Chicago branch manager and, before that, was a member of the field sales force. He has been with Peerless Pump since 1948. At the same time, it was announced that the Peerless southwestern district office is being shifted from Lubbock, Tex., to Dallas. The branch office will remain in Lubbock.

Rockwell Mfg. Co. appoints chief officer for Canadian operations

A. R. Cyr

Col. Arthur Robert Cyr, former commanding officer, Frankfort Arsenal, Philadelphia, has joined Rockwell Mfg. Co. as executive vice president, Rockwell Mfg. Co. of Canada, Ltd., according to G. T. Bowman, vice president of Rockwell's International Division. Cyr, a 1933 graduate of West Point, served in the Ordnance Corps since 1939 in a variety of posts in the United States and abroad. In his new position he will headquarter at Guelph, Ont.

"Triple Threat"
TO SUCKER ROD FATIGUE
1. JONES SUCKER RODS
2. JONES UNDERCUT PINS
3. JONES ROLLED THREADS
1
Rolled threads are stronger at the point where most pin failures originate . . . steel fibers and grain are rearranged to follow the thread contour, providing a dense structure at the critical thread root. Sucker rods with rolled threads make up tighter and stay tight because there are no high spots to beat down and cause the joint to loosen.
Undercutting the pin shank further increases fatigue resistance by eliminating the run-out thread and improving the elasticity of the joint.
Ask your Jones representative for further information on the "Triple Threat".
THE S. M. JONES COMPANY
Division of Buffalo Eclipse Corporation
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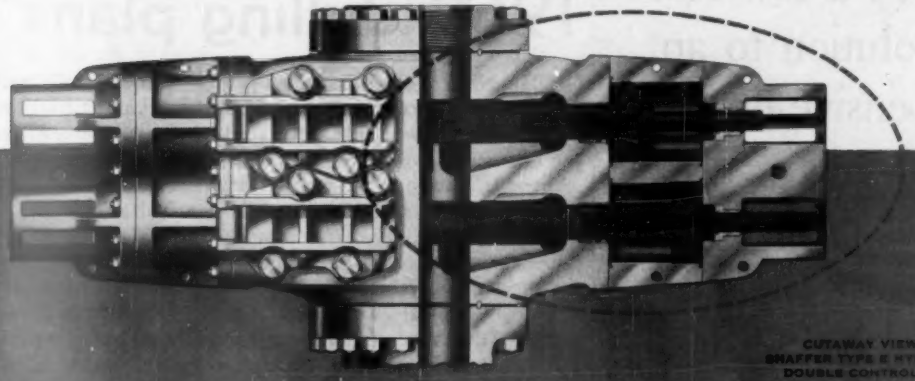
2
3
JONES
SUCKER RODS

WHEN YOU BUY BLOWOUT PREVENTERS

GET SHAFFER "IN-LINE" POWER DRIVE ...IT'S POSITIVE!



CUTAWAY VIEW OF SHAFFER TYPE E HYDRAULIC DOUBLE CONTROL GATE, SHOWING "IN-LINE" POWER DRIVES

WHAT IT IS... In Shaffer Blowout Preventers there is no complicated system of levers, rods and linkages connecting the rams with the hydraulic pistons that operate them.

Instead, each Shaffer ram and its operating piston is on a *single* stainless steel shaft that is fully enclosed within the body of the Preventer. When the piston moves the ram moves. There are no complex connections to jam, freeze or otherwise jeopardize positive action!

WHY IT'S BETTER... By eliminating levers that rock, connections that rotate and exposed linkages that move, you eliminate potential trouble spots that can interfere with quick, *positive* action when emergencies threaten.

- Shaffer Preventers give you the simplest, most trouble-free ram and piston design it is possible to build—with both the ram and its operating piston on a *single* shaft—and no complicated connections in between!
- Pressure seals are also reduced to a minimum because far fewer seals are required. And any time you eliminate seals you reduce maintenance, as well as possible problems, when high well pressures are encountered.
- Shaffer's design also means elimination of connections that require frequent oiling or greasing... elimination of exposed operating parts that can become corroded by chemical-laden mud or well-treating fluids... elimination of levers or yokes that can become jammed by loose boards, pieces of pipe, or other objects falling from the rig floor.

RESULT... When pressure emergencies threaten the safety of your well, Shaffer Blowout Preventers provide unequalled assurance of *positive* ram operation... and this is just one of the many "plus" advantages built into *every* Shaffer Blowout Preventer!*

THERE'S A SHAFFER BLOWOUT PREVENTER FOR YOUR PARTICULAR REQUIREMENT!

TYPE B and TYPE E Preventers are the units selected for most drilling applications. Type B has *non-rising* Locking Shafts for maximum compactness... Type E has *rising* Locking Shafts for quick ram indication.

TYPE XHP Preventers are ideal where extra-high well pressures are a problem. Each XHP unit is individually tested to 15,000 PSI *Working* Pressure in 7 1/16" Bore Size... to 10,000 PSI *Working* Pressure in 9" and 11" Bore Sizes.

TYPE LWS Preventers combine lightweight with adequate pressure rating for a wide range of applications. LWS units weigh approximately *half* as much as other Preventers of comparable size.

The above Preventers (except Type XHP) are available in choice of *Double* units *(two* Preventers unitized into one compact body for maximum space-saving)—or *Single* units.

See your nearest Shaffer representative for complete details. Or write direct!

***OTHER SALIENT SHAFFER ADVANTAGES...**

- **"Swing-Open" Doors for Quick Ram Changes!**
- **Space-Saving Compactness!**
- **Self-Cleaning Ram Compartments!**
- **Completely Enclosed Construction!**
- **"Floating" Ram Design!**

...and still others your Shaffer representative will gladly explain to you!

38 years OF OIL TOOL LEADERSHIP

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HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

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Dowell
Paraffin Solvent
. . . a low-cost
solution to an
expensive problem

Dowell Red Paraffin Solvent is a non-chlorinated, oil-soluble material designed to dissolve paraffin accumulations . . . even when complicated by asphalt, salt, sand, gum or wax. Dowell solvent is chemically neutral. It contains no acid.

Dowell Red Paraffin Solvent weighs 10.4 pounds per gallon. It is often used at its full concentrated strength. However, it may be diluted easily with kerosene, gasoline, benzene or xylene to provide an effective, low-cost solvent for specific paraffin problems.

Dowell Paraffin Solvent is available at all Dowell stations and many oil field supply stores in convenient 10-gallon steel drums.

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DRILLING CONTRACTORS

Firms announce 1962 drilling plans

THE NEW YEAR will get off to a good start in some drilling arenas. Already under way are some drilling campaigns which will carry into a sizable portion of 1962. One company announced a drilling program that will continue for 3 years. Here's a sample of what's in store for the coming year:

North Central Louisiana. One program that was announced earlier is now under way. Olin Mathieson Chemical Corp. made a 3-year contract with Marshall R. Young Drilling Co., an independent oil operator in Fort Worth, to drill a minimum of 100 wells. Under terms of the agreement, 133,000 acres in Caldwell, Jackson, and Winn parishes will be explored. The lease is one of the largest mineral transactions in the history of North Louisiana and involves part of the timber holdings of the forest-products operations of Olin's packaging division.

It all started when two Shreveport men, A. D. Brannan and G. E. Buddecke, took a lease option from Olin and Brown Paper Mill. They turned the drilling operation over to Marshall Young. To earn 5-year leases covering all rights to the base of the Wilcox, the operators will be obligated to drill 100 Wilcox tests. In this area, a producing well will hold all of the acreage within a government section on which it is drilled.

The first seven locations have been staked. These wells will vary in depth between 1,100 and 2,000 ft. Recent interest in the area was stimulated by the development of the Vixen and Calhoun gas fields and the Colgrade oil field.

Under a royalty agreement, Olin and its minority partners in the minerals will receive a substantial share of the production profits. The operators will bear all costs of exploration and drilling. Marshall R. Young holds an option to extend its drilling operations for 2 additional years.

Arkansas' Arkoma basin. Two wildcat wells will be drilled in the Arkansas portion of Arkoma basin upon the completion of three now drilling. Operator is Wheeler & Ryan, oil and gas producer in Tulsa.

A long-range plan of drilling 13 more wells in Arkoma basin in the next 18 months. Of these, one is a development well in the Spadra field of Logan County, and the other 12 are wildcat ventures in Yell, Logan, Scott, Sebastian, and Conway counties. These wells will vary from 6,000 to 12,000 ft. in depth.

Of the wells now drilling, one is in the Dover field of Polk County and two are in the Gragg field of Sebastian County. The two immediately proposed wells are a 6,000-ft. test on the Midlands anticline of Sebastian County and a 12,000-ft. well on the East Ranger anticline in Yell County. Altogether, Wheeler & Ryan holds an interest in more than 110,000 acres in Arkansas.

Participating in the drilling program with the Tulsa firm are: Mobil Oil Co., Halliburton Oil Well Producing Co., Sun Oil Co., Ambassador Oil Co., Sunray Mid-Continent Oil Co., Solar Drilling Co., and Petroleum Consultants, Inc.

South Texas. Zapata County's Wilcox formation will get continued action with drilling planned by several operators. Among those that will be doing work in this area are: Atlantic Refining; Gulf Oil Corp.; Union Producing Co.; Michel T. Halbouty; Jonnell Gas, Inc.; and J. C. Trahan, Drilling Contractor, Inc.

Jonnell Gas of San Antonio has announced it will explore its large leasehold in Zapata County. It has made an agreement with J. C. Trahan to drill three Wilcox tests on a 3,300-acre tract on the southwest edge of Herlinda Vela field. Also, Jonnell will join Cox & Hamon in the drilling of an 11,500-ft. test in the same area.

Michel T. Halbouty and Jonnell

are now drilling a 13,000-ft. offset well, 1 Alberto Trevino, a confirmation test 3,300 ft. north of the newly discovered South Escobas - Wilcox field. The field opener was the Michel T. Halbouty B-1 Lauro Garza, completed October 24, 1961. Total depth was 11,015 ft. and IPF was 43 M.M.c.f.d. of dry gas from the Wilcox at perforations from 10,784-94 ft. and from 10,800-15 ft.

Jonnell and Halbouty plan to drill three additional wells during 1962 on Jonnell's 6,000-acre block in this sector.

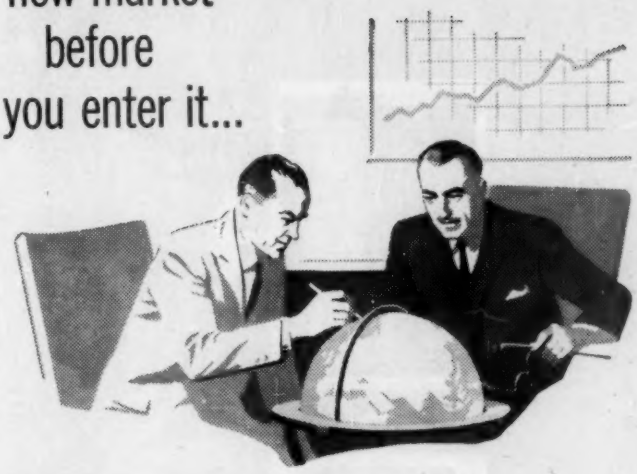
Montana. Northwest of Tule Creek, a new discovery was recently completed by Calvert Exploration and D. G. Hamilton. Operation is 1 Listug-Olson, NE SW 34-31n-47e, Roosevelt County. At perforations from 7,522-28 ft. and 7,532-36 ft. in the Devonian-Niska, following acid treatment with 250 gal. mud acid, well flowed 188 bbl. oil in 11 hours.

Humble Oil & Refining Co. has announced three locations which will be staked in this vicinity. Recent reports indicate that these wells will offset the discovery well in three directions. Total depths of the tests will vary between 7,500 and 7,550 ft. The depths in this area are 100 to 150 ft. less than the Devonian-Nisku pay at Tule Creek which is approximately 3 miles to the southeast. Murphy Corp. also plans a well in this area.

Wyoming. In the Powder River basin, four new Minnelusa wildcats will be started soon. Three of these tests will be in Crook County and one in Campbell County. Davis Oil Co. is the operator for the Campbell County venture, 1 Larsen, C SW SW 26-51n-69w. Proposed total depth is 8,000 ft. and the location is over a mile east and south of current drilling to the Minnelusa. Nearest Minnelusa production is found at Prong Creek which is 6 miles east.

The three Crook County tests will be drilled by Petroleum, Inc., U. S. Smelting, Refining & Mining, and Murphy Corp. The Petroleum, Inc., test will be the deepening of a previous Cretaceous failure, 1 Krause, C NW NE 31-49n-68w, 3 miles east of Raven Creek Minnelusa production. The wildcat of U. S. Smelting is the 1 Woods, C NE NE 28-51n-68w, a mile southeast of Dakota pay at Miller Creek.

you survey
a new market
before
you enter it...



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this Banking connection
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Interested in Canadian oil and natural gas? The *right* banking connection can be invaluable. That's the kind of connection you can make with The Toronto-Dominion Bank.

Toronto-Dominion specializes in banking for the oil and gas —and related—industries. Our experienced Oil & Gas Department in Calgary is in close and constant touch with the industry. It can furnish you the facts and figures you need—can advise you on new trends and developments, credit standings, equipment distributors.

Our more than 570 branches from coast to coast include locations at all the major oil and gas fields. They put "The Bank" in a unique position to give you on-the-spot banking help and related assistance.

Investigate for yourself our complete banking services. You can start by sending for our map showing Western Canada oil and gas fields—plus Toronto-Dominion branches in the area.

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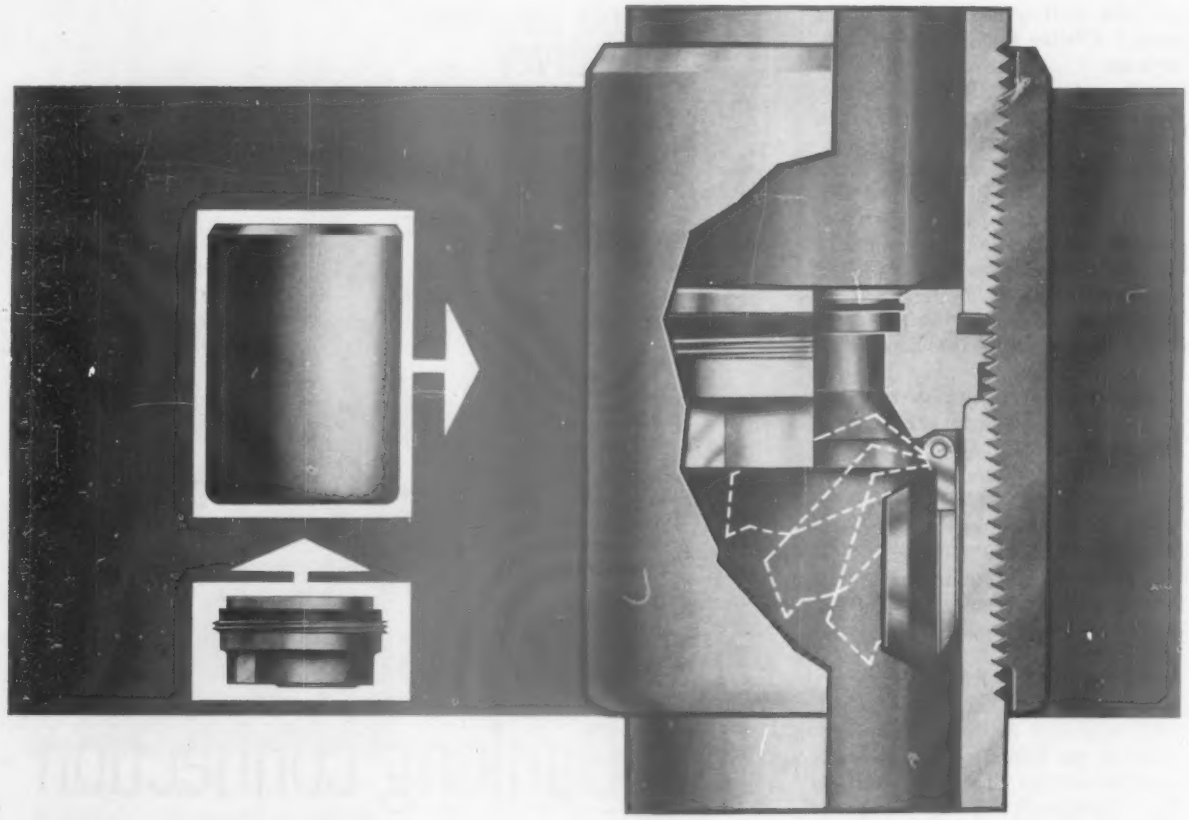

How ordinary Casing Couplings become ECONOMICAL FLOAT COLLARS

One simple operation makes an economical float collar out of an ordinary casing coupling . . . when you screw a threaded HALLIBURTON INSERT FLOAT VALVE directly inside one end of the coupling. Then it's ready for making up in the casing string one or two joints above the guide shoe, eliminating two threaded connections.

For wells where a medium pressure differential exists, this Insert Float Valve — with rubber sealing rings on both flapper and seat — provides all the fluid-tight seal needed to buoy casing while running-in. The valve allows a large flow area through its easily-drillable cast aluminum body and flapper valve. A stout coil steel spring keeps the valve closed while running-in and upon completion of cementing.

Sizes available from Halliburton range from 4½" to 13⅜". See your Halliburton man to purchase these economical float valves for your casing strings.

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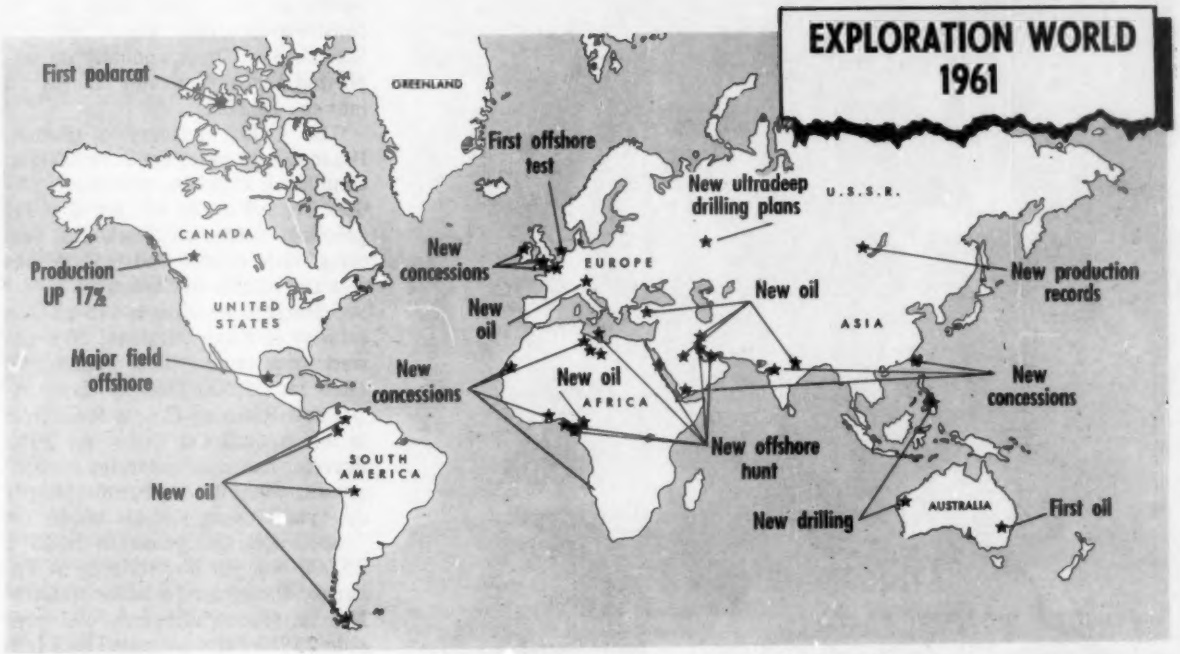


What in the world happened in '61?

BY FRANK J. GARDNER

IT SEEMS appropriate in this world-wide issue of the Journal to take a quick look at what went on in foreign exploration during 1961. And a lot went on.

Drilling, of course, always takes top billing in any such survey. The most interesting wildcat of the year was spudded on Melville Island in the Canadian Arctic, and is now nearing its 10,000-ft. target. Russia came up with plans for five Mohole-type ultradeep tests stretched across the western part of the USSR; objective depths range from 33,000 to 49,000 ft. First wildcats were spudded in the Spanish Sahara. Wildcatters moved back into western Australia after a long period of quiet. The Philippines began to attract attention again as drilling plans were announced there. And nearly every continent saw new offshore rigs set up in new places: Kuwait, Iran, Holland, Mexico, Gabon, Nigeria, Egypt, Yemen, and Libya—all moved into the offshore play.

There were new **concessions** of great interest in many countries. A group of Oklahomans moved into Formosa. Tidewater, Sun, Superior, and Stanvac shouldered into West Pakistan to compete with the Russians in the hunt for Pakistani oil. John Mecom, of Houston, took a 10,000-sq.-mile block in Yemen, on and offshore. Belgium issued exploration licenses for the first time, to Royal Dutch-Shell, and to a group of local mining companies. Esso moved into southern England on the hunch that the Paris basin spans the English Channel. Southwest Africa, Togoland, and Mauretania fattened the African hunting ground by granting exploration rights. India teamed up with France to explore the Jaisalmer. Thailand prepared to grant concessions. And in Ireland, Ambassador Oil continued to look for a well site covered with four-leaf clovers.

Australia hits

Most important **discovery** of the year came at year's end in Queensland, Australia, when Union of California announced a 1,765-bbl. flow of oil at Moonie 1. Mobil International scored heavily in its first Barinas test in western Venezuela—a 2,600-bbl. well. Colombia's Middle Magdalena Valley paid off handsomely for Cities Service, as Payoa 1 flowed 5,410 bbl. a day from five zones. Chile found its best field yet at Daniel Este, while Bolivia rewarded Gulf Oil with a strike near Santa Cruz. East Germany announced its first discovery at Reinkenhagen, and Turkey's state-owned company got a 1,000-bbl. well near Batman. Libyan oil remained No. 1 target of the world, as lush new fields were found in the east and in the west. Gabon added two new fields, Iran developed Ahwaz into a major field, the Russians discovered oil in India at Kalol, and Saudi Arabia calmly announced a 7-billion-barrel hike in its reserve figure.

Production records fell in Canada (up 17%), and Russia pushed production to new highs, as the world turned wary eyes on soviet exports.

It was a busy year in a busy world. And if there's too much oil in that world, apparently nobody told the Russians, the French, the Dutch, the British, the Indians, Australians, South Americans, Canadians, Africans, Irishmen, Germans, or the Americans.

At least five sedimentary basins of considerable area have been mapped in the Philippines. Of these, two are in Luzon, one on Panay Island, and two in Mindanao. All have an alternating sequence of marine sandstones, siltstones, and limestones of Miocene age varying from at least 2,000 ft. to well over 10,000 ft. in thickness, overlain by younger Tertiary rocks. Sedimentary and tectonic data available, combined with known seeps, show that suitable reservoirs and trapping formations are evident in the Tertiary formations.

Philippines need commercial production

BY JOHN C. McCASLIN
Geological Editor

THE PHILIPPINE ISLANDS are the only major group in the 6,000-mile archipelago stretching from Siberia to Indonesia lacking at least some commercial oil production. Rapid growth of the nation's economy and population since World War II forces more than a casual look into the oil potential of this new Asian republic.

Present Philippine demand for petroleum products is about 55,000 bbl. per day. Annual increase is about 10%. One refinery is now in operation, and three more are in construction stage. About $60 million U. S. is spent annually on importing both crude and refined oil into the islands.

The Caltex refinery at Bauan, Batangas, 70 miles south of Manila, completed in 1954, processes 24,000 bbl. of crude oil per day for gasoline, kerosine, diesel, and fuel oils. Crude is imported from Minas and Duri fields in Sumatra.

Stanvac is building a $45 million refinery at Limay, Bataan, 20 miles west of Manila. This refinery is rated for 25,000 bbl. per day.

Filoil Refining Co., a local firm in which Gulf Oil Corp. has 30% interest, has received refinery concession to build a 10,000-bbl. per day plant using Kuwait crude.

Shell Oil Co. plans to build a 25,000-bbl. per day refinery at Tabango, Batangas, 76 miles south of Manila. The Philippines will provide 25% of the estimated $43 million to build the plant. Construction is under way with completion due in 1962.

A long history. Oil has been known in the Philippines since 1896. Shallow drilling was done on Cebu more than 60 years ago. One well is still being bailed for 1 bbl. daily of 30°-gravity oil from a 500-ft. hole drilled about 1900. Some hand-dug wells in southern Luzon made up to 2 bbl. daily about 40 years ago from 300-ft. holes.

The search for oil in the islands really began at Toledo in 1896, scene of today's best oil recovery. This exploration for oil continued off and on until World War II. After liberation from the Japanese, oil-hungry Filipinos resumed the search on a very small scale until 1956 when a marked increase in exploration began.

New laws. The passage of the new Petroleum Act of 1949 which liberalized the legal requirements for exploration and development, and encouraged private companies to begin exploration, was the cause for the upswing in interest. The new laws passed in 1960 by the Philippine Congress should stir operators looking for oil even more. One of

the two new measures provides for possible suspension of the penalty for noncompliance with work-obligation expenditures under certain conditions. The other law provides for a 27½% depletion allowance as a deduction from gross income from oil and gas wells.

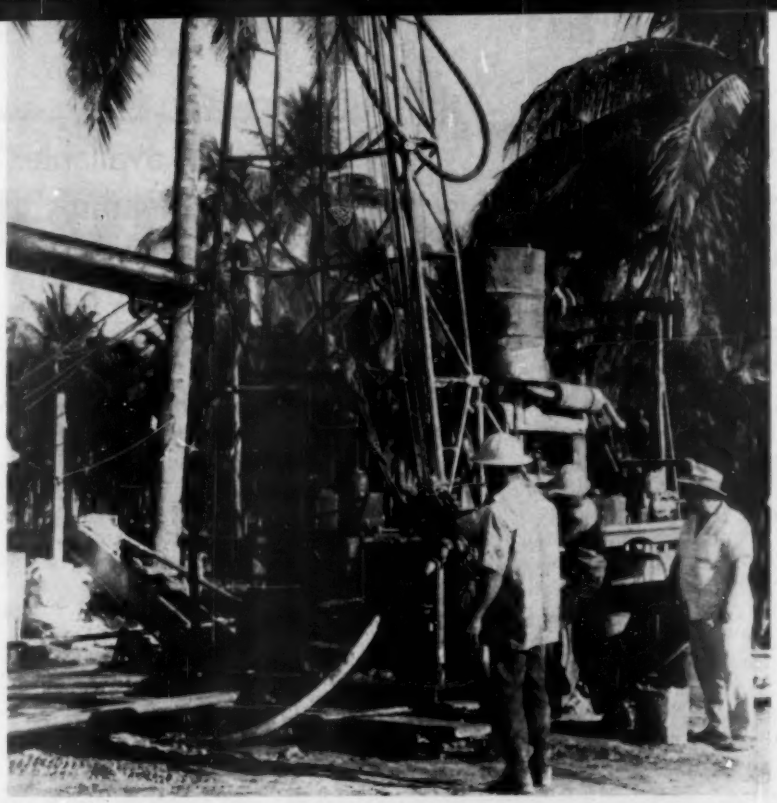
Surveys. No systematic geologic survey was ever made in the islands until a few years before the last war.

A government-owned National Development Co. arranged for such a survey to be made by a team of geologists headed by Grant W. Corby. This team made extensive surveys in an attempt to determine the extent of the potential oil areas in the islands. Particular attention was paid to the stratigraphy of the Tertiary sequence and the regional correlation by biostratigraphic methods of the stratigraphic sections in the various basins. The large islands of Palawan and Mindanao in the southern part of the republic were not included in this survey. Corby published the details of his survey in 1951. The data found by these surveys have been and will be a valuable guide to future activities in the islands.

In the past few years most of the companies active in island exploration have done most of their work in their own concessions. But there have been a few detailed surveys, particularly in the Cagayan Valley. Most of the concessions can still be considered to be in very early stages of surface exploration. Much detailed geologic study still remains to be done before the stage can be set for wildcat locations.

Before the war, only sporadic biostratigraphic research had been done in the islands. A paleo lab wasn't set up until 1939 to study the problems of regional correlation of the Tertiary sequences in the islands. The Corby survey provided a fairly firm basis for preliminary subdivision of the sequences, and criteria were set up for correlating the sequences from basin to basin, based on both the larger and smaller foraminifera, and on the mollusca. This system has held firm until today with but few revisions. Four paleo labs are now in operation in the Philippines, two maintained by the government.

There has been little geophysical exploration in the islands. Some marine gravity surveys have been run by holders of offshore concessions, and a limited amount of gravity and seismic surveys have been made. American companies are now available in the islands for magnetometer, gravity, and seismic surveys.



A BLOWOUT OCCURS while drilling MST-11, the Philippines' first free-flowing oil well. Location is on the American-Asiatic Oil Corp. concession at Daanbantayan, Cebu. On extreme right is Lar.ey Watkins, Stanvac's drilling superintendent.

Wells drilled. From 1896 to 1958 there were 33 wells drilled in the Philippines. Only 10 of these had no oil or gas shows. Depths ranged from 126-13,512 ft.

In 1959 there were 14 wells drilled, 2 of them oil producers, 1 a small noncommercial gasser. In 1960 there were 32 wells drilled with a total footage of 84,263 ft. Six wells were deep wildcats, ranging in depth from 3,629 to 9,336 ft. There were 25 strat tests put down, none of which went below 2,600 ft.

The two producers drilled in 1959 were on Cebu Island at Republic Resources Development Corp. 1-A-X and 1-A Reina Regente. The discovery well flowed 72 bbl. of oil per day from pay at 1,300 ft. The offset well made 216 bbl. per day at 1,700 ft. Output from the two wells in 1960 was about 2,500 bbl. of 44°-gravity crude.

Most 1960 exploration was on the Island of Cebu where 14 wells were drilled. Oil and gas shows were found in eight of these. Eleven strat tests were drilled on the west side of Leyte and on Camotes Island. Good shows were found in five of these wells drilled on Leyte. These good showings year after year keep hopes fired up for good commercial production soon in the Philippines.

Exploration picks up. Exploratory activity in the Philippines in 1960 stepped up considerably over previous years. At the end of 1960 there were 33 companies or individuals who had applied for concessions on 36,194 sq. miles located on the various islands and on some shallow-water areas in and around the islands. Concessions have been granted on 31,808 sq. miles. A list of petroleum concessionaires and/or applicants showing their holdings in hectares as of December 31, 1960, accompanies this article.

Here are some reasons why oil hopes in the Philippines remain high:

- Thick marine sediments have been correlated definitely with similar deposits in Borneo, Java, and Sumatra.
- Gas or oil shows have been

common, in tests throughout the years since 1896.

- Most of Indonesia's oil comes from Tertiary rocks. Tertiary rocks fill all of the basins in the Philippines.
- Most Far East oil comes from long, narrow geosynclinal basins such as those found in the Philippines.
- Asian basins have sediments ranging from 16,000-31,000 ft. Philippine basins appear to be 9,000 to 30,000 ft. thick.
- Source rocks in many Far East producing areas are believed to be a shale containing abundant organic material. This type of shale has been found in nearly all Philippine basins.
- Most Far East production comes from reservoir rock consisting of more or less shaly sandstone. Sandstones crop out abundantly in the Philippine basins. The only drawback might be that Philippine sandstones are often feldspathic. But some geologists believe there is enough porosity and permeability in these rocks to act as reservoirs.
- Quartz-bearing sandstones in the islands appear to have excellent reservoir characteristics. There are also vuggy reefy limestones.

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- Most Far East oil comes from anticlines. The islands have many anticlines, both known and suspected.

The Philippine archipelago contains a number of relatively small Tertiary sedimentary basins, some of which contain oil seeps and have had oil shows in wells. The archipelago is made up of 10 large islands and about 7,000 small islands. Comparison of the Tertiary geologic histories of Indonesia and the Philippines indicates the close geologic relationship between the two archipelagos.

Thick marine sedimentary deposits were laid down during Tertiary time in intraisland basins, interisland seaways, and on interisland platforms. Among the intraisland basins are the Cagayan Valley of northern Luzon, the Central Valley of Luzon, the Iloilo basin, and the Agusan and Cotabato valleys of Mindanao. Bondoc Peninsula is a former interisland seaway. Northwest Leyte, Cebu, and a part of Bohol are former interisland platforms.

The basins of the Philippines include:

Central Luzon Valley. This is the easiest to get into. It runs from Manila Bay on the south to Lingayen Gulf on the north. This valley is bounded on the east by the Central Cordillera and on the west by the Zambales Range. It is a north-south trough about 35 miles by 100 miles. The north part of the trough plunges north and contains a thick Tertiary section. The south part is covered by thick alluvium and tuff, concealing the Tertiary sediments. The most favorable of three anticlines known in the valley is the Tarlac in which Pliocene and older beds are folded. Other anticlines may be present, but it will take considerable geophysical work to find them.

Cagayan Valley. This structural depression is bounded on the north by the Babuyan channel into which it opens seaward. The northern part of the Sierra Madre Mountains lines it on the east, the Caraballo Mountains on the south, and the Central Cordillera on the west. Sediments dip steeply near the basement rocks on the basin fringe, gradually flattening toward the valley axis. Post-Pliocene deformation caused a series of north-south folds in Tertiary sediments in the valley. There are anticlines with good closure in the center of the basin.

Concessionaire and/or applicant—	Concessions	Applications
1. Acoje Oil Exploration & Drilling Co., Inc.	161,505	43,972
2. American Asiatic Oil Corp.	615,950	80,765
3. Anglo-Philippines Oil Corp.	715,853	47,100
4. Apayao Mining & Oil Co., Inc.	115,184	.....
5. Baguio Gold Mining Co.	148,221	.....
6. Benjamin B. Andrada	45,441	50,530
7. Bienvenido R. Medrano	99,115	.....
8. Bulacan Iron Mines, Inc.	95,738	.....
9. Consolidated Mines, Inc.	124,400	46,622
10. Continental Oil Co.	219,639	99,447
11. Filipinas Oil & Mineral Corp.	172,422	121,348
12. Golden City Oil & Development Corp.	215,824	40,768
13. Gonzales, Joaquin	.....	59,242
14. Hixbar Mining Co., Inc.	448,967	52,884
15. J. Amado Araneta	253,674	.....
16. Luzon Stevedoring Corp.	24,218	.....
17. Petrogas of the Phil., Inc.	96,850	.....
18. Manila Mining Corp.	20,024	.....
19. Maremco Mineral Corp.	362,037	93,897
20. Marinduque Iron Mines Agents, Inc.	140,271	22,939
21. Pacifica, Inc.	355,108	118,883
22. Philtex Oil Development, Inc.	179,989	23,820
23. Philippine American Oil Devel. Co., Inc.	145,243	.....
24. Philippine Oil Devel. Co., Inc., PODCO	651,400	.....
25. Raymunda G. Abila	95,831	84,646
26. Republic Resources & Dev. Corp. REDECO	662,394	43,608
27. Saint Philomena Oil Dev. Co., Inc.	183,815	.....
28. Samar Mining Co., Inc.	165,072	52,995
29. San Jose Oil Co., Inc.	645,269	.....
30. Standard Vacuum Oil Co.	219,206	.....
31. Texaco Overseas Petroleum Co. and Calif. Asiatic Oil Co.	450,423	.....
32. United Asia Oil and Mining Dev. Co., Inc.	123,344	52,697
33. White Eagle Overseas Co., Inc.	288,008	.....
Total Hectares	**8,240,435**	**1,136,163**
Total Sq. Miles	**31,808**	**4,386**

From AAPG July Bull. 1961, p. 1233.

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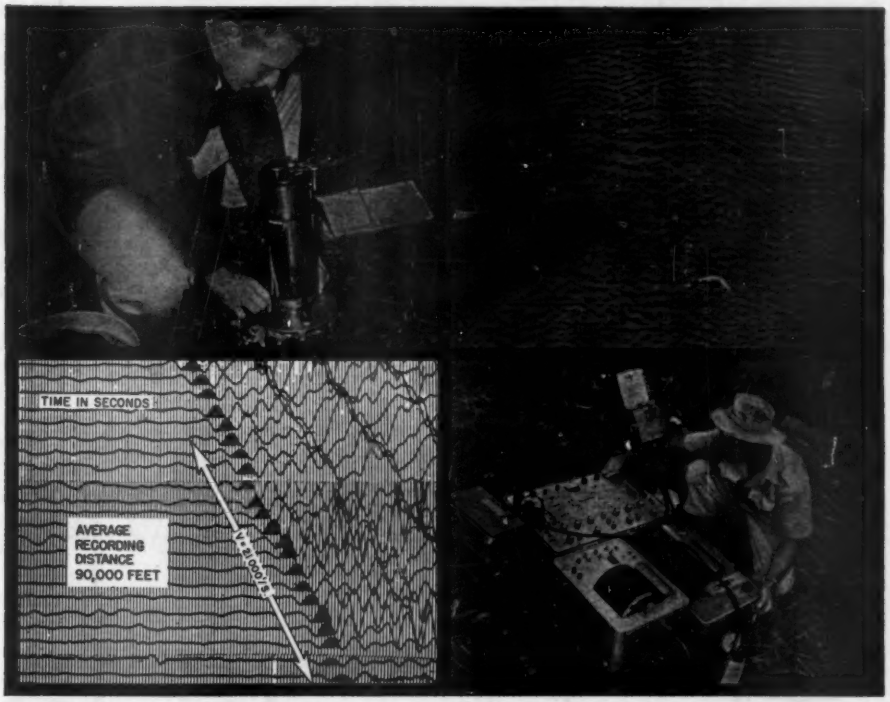

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There are excellent trapping possibilities on the north side of the basin.

The Lubuagan coal measures in this valley are of both marine and nonmarine deposition. The section is quite thick, has high organic content, high porosity, making it an excellent candidate for possible source and reservoir beds. The upper part of the Callao limestone is mostly reef corals. High porosity makes it a promising reservoir. Seeps have been noted on the west side of the basin.

Iloilo basin. This basin is lined by basement rocks on the west, north, and northeast. It is 30 miles wide and 40 miles long. Sediments dip quite steeply where they hit the basement, gradually leveling off toward the basin axis. No oil or gas seeps have been reported on Panay Island, but the thick sandstone members of the Singit and Tarao formations are favorable source rocks. No anticlines have been found by surface mapping, but three structural noses have been located in the basin. Seismic surveys have indicated several deep structures in some places. Thick alluvium cover forces a great deal more seismic work.

Bondoc Peninsula, the Ragay Gulf, the Burias and Ticao islands. These are in an area where thick sediments have accumulated within interisland seaways. Strong tectonic activity and vulcanism gave this region a highly faulted and complex geologic structure. Some anticlines have been mapped in the south end of the peninsula. Porous reservoir rocks such as the Vigo, Molave, and Maglithi, plus oil seeps, make this a must for oil hunters to explore. Several wells have been drilled in the years beginning in 1906.

Northwest Leyte Peninsula. This lies between eastern Leyte and Bohol to the east. Basement rocks form the core of the island in the north-central part. Oil seeps have been known on Cebu since Spanish times. Considerable drilling has been done on this island in past years. Two anticlines on the north side and two on the south are favorable structural oil traps. The Malubog and Maingit formations are porous and permeable. Two wells drilled 160 ft. apart found small amounts of shallow oil back in 1896 at Toledo.

Current activity. Last November, a local Philippines company reported plans to drill 15 shallow wells in 1962 to evaluate a shallow discovery on the north tip of Cebu Island.

American Asiatic Oil Corp. has acquired a rig to drill the wells. Each will go to about 1,200 ft. near the DST-1 discovery which came in last March. That well made 144 bbl. of oil per day on ¾-in. choke. Pay was at 238-ft. A stepout well, the MST-11, tested 56 bbl. per day at the same depth, but had shows on down at 990 ft. On the basis of stratigraphic drilling, the company estimates the structure to be ¾ mile wide and 3½ miles long. While American Asiatic retains 100% interest in the license area on which the oil is located, the company has farmed out part interest in other licenses in the area to affiliates of Jersey Standard and Mobil International. Each of the latter companies holds 25% interest in areas of joint agreement.

The accompanying list of five small oil producers in more than 60 years of exploration seems rather insignificant. Years of disinterest, war, and other economic problems, are a few of the many reasons the number of wells drilled in the Philippines seems small.

The Philippines, like its neighbor to the south, Australia, is merely entering the long exploratory path that has featured the hunt for oil throughout the world. Someone will find a flush producer, and the list of oil wells will climb. The nation has the geology for oil, the legislation needed to induce exploration, and the demand is growing by the year. We should see the last gap in the long oil-bearing chain of islands in the western Pacific filled in soon.

Important oil finds in the Philippine Islands

1. Republic Resources Development Corp. 1-A-X Reina Regente, Cebu Island. IPF 216 BOPD at 1,700 ft. 1959.
2. The 1-A Reina Regente, discovery well, Cebu Island. IPF 72 BOPD, 1,300 ft. This field promised the nation its first real commercial producer in 1959.
3. Hixbar Mining Co. Inc. 1 Malolos, Aloguinsan, Cebu. Tested oil at 7,132-7,220 and 7,302-26 ft. Total depth 9,107 ft. 1960.
4. American Asiatic 1 DST, Cebu. IPF 144 BOPD, ¾-in. choke, 46°, 238-243 ft.
5. American Asiatic 11-MST, Cebu. IPF 56 BOPD, 240 ft.

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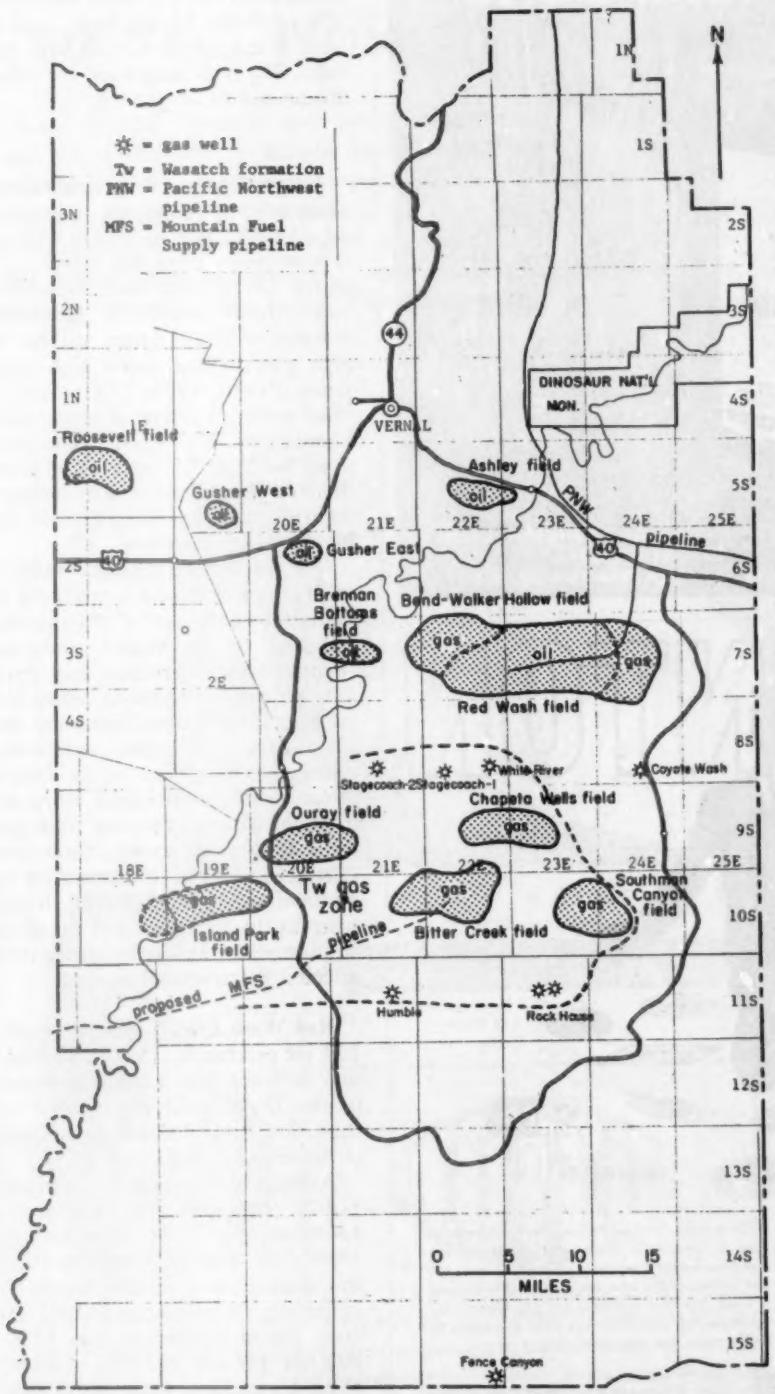

THE FIRST COMMERCIAL OIL FIELD in Utah, Ashley Valley, was discovered in Uintah County in 1948, ushering in Utah's present booming petroleum industry.

UINTA BASIN is fast becoming one of the major oil and gas provinces in the western United States.

In 1944 Carter Oil Co. began serious oil exploration in the basin, using surface geologic reconnaissance and geophysical techniques. Several of the early discoveries were made on geophysical anomalies which later proved to have no significant relationship to the accumulations. Oil and gas in the Tertiary nonmarine lacustrine and fluvial sediments occur mainly in stratigraphic traps, and subsurface geologic interpretation is probably the most reliable technique used in the basin today.

In 1948 commercial quantities of oil were produced in Equity Oil Co.'s well at the Ashley field, near Jensen. This oil originated in the marine Park City formation and accumulated in the Paleozoic sediments of the Weber formation. It is noteworthy that other attempts to produce oil from Paleozoic sediments in the county have failed, although the Weber sandstone was found to constitute an ideal reservoir formation wherever it was tested.

The discovery of the Roosevelt field in 1949 launched the search for oil in the theretofore little-explored Tertiary sediments of the Uinta basin proper. In the search for oil in the basin many excellent shows of gas were recorded in the Tertiary sediments, but without a transmission pipeline these shows were, at least temporarily, disregarded. In time, however, the great gas reserve of the basin came to have greater significance than the oil. With the advent of transmission facilities now under construction into the basin, these gas reserves will at last be drawn upon. In early 1961 only the Red Wash-Walker Hollow oil and gas fields had access to pipeline facilities.

The 1961-1962 season is expected to see the third-largest exploration

From "The Mineral Resources of Uintah County," by R. G. Pruitt, Jr.

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effort in the United States commenced in the Uinta basin, much of it in anticipation of the new transmission facilities which will tap the great Wasatch - formation gas-production fields.

A count of wells completed in Uintah County to the end of 1960 shows a total of 318 wells, including 179 oil wells, 52 gas wells, and at least 3 combined oil and gas wells. The remaining wells are either abandoned or suspended.

Oil Fields

Except for the Ashley field, which produces from Paleozoic sediments, all oil production in Uintah County is essentially from the lower unit of the Green River formation (Eocene), from nonmarine lacustrine sediments. The Tertiary oil has a high wax content and a high pour point (Picard, 1956, 1957), is very black-green to yellow in color, with a gravity of 29°-33° API. The pour point is 85°-90° F. and the oil from the Red Wash field is now blended with oil from the Rangely field for pipeline transportation.

The two distinct geologic environments from which oil is produced in Uintah County are: (1) Paleozoic sediments in the Weber sandstone (Pennsylvanian-Permian) and Park City formation (Permian), which are considered a common reservoir, and (2) Tertiary lacustrine sediments, mainly the lower unit of the Green River formation (Eocene). Some oil is produced as condensate from gas wells in the Mesaverde formation (Cretaceous). The Paleozoic oil is accumulated in structural traps, whereas the Tertiary oil is found in stratigraphic traps, only secondarily affected by structural controls.

Red Wash field. Total 161 wells, 139 oil producers, 15 gas. Production is from thin sandstone lenses in the Douglas Creek member of the Green River formation at depths of between 4,700-6,000 ft.

Average production is currently 11,000 bbl. per day and over-4,000,000 bbl. were produced in 1960. The discovery well in 1951 was drilled on a seismic anomaly, indicating a west-plunging anticlinal nose. Initial production was 12 to 392 bbl. per day and 784 to 4,960 M.c.f.d. gas. Most wells in this field must be pumped.

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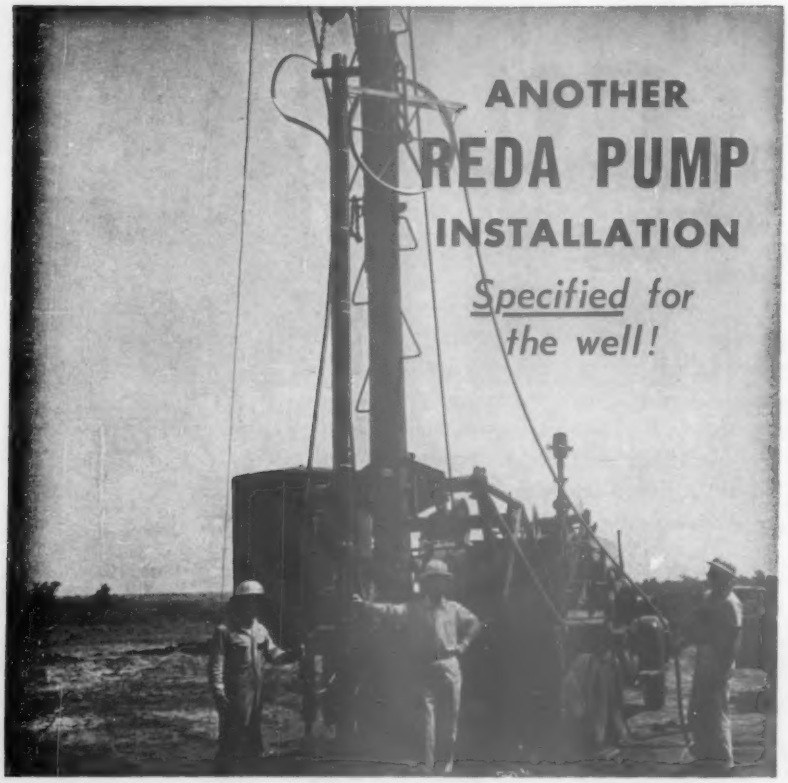

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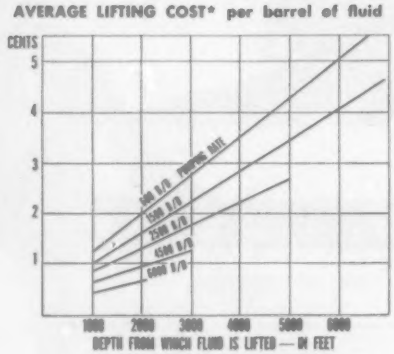

*Included: Electric Energy (10 Mills Per KWH), Run and Pull, Repairs, Upkeep, Transportation, Labor and Amortization (8 Yrs.)

Chart "A"

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owns most of the field, which is the second-largest in the Uinta-Piceance basins (Picard, 1957). Oil reserves (including secondary-recovery methods) are estimated at over 200,000,000 bbl., making it one of the major oil fields in the United States.

Ashley field. Total 36 wells, 28 oil producers, 1 gas. Production is from Weber sandstone (and Park City formation contact zone), which is an excellent reservoir, at depths of 4,000-5,000 ft.

In 1960 this field produced 3,000 bbl. per day for a total of 1,400,000 bbl. (Thomas and Campbell, 1960). The discovery well in the fall of 1948 was on a northwest-southeast-trending faulted anticline, on a closure estimated to be 300 ft.

Initial production was 260 bbl. per day with low gas-oil ratio. The field has a very strong water drive, with the water level 600-20 ft. above sea level in 1957. The field is still a steady producer, indicating reserves of about 20,000,000 bbl.

Roosevelt field. Total nine wells, four oil producers. Production is from fractures in a black shale zone of the Green River formation (Eocene), at depths of 9,000-10,000 ft.

The discovery well in 1949 was drilled on gravity - seismograph anomaly, but production is from the fracture porosity in the sediments. Initial production from the discovery well was 1,607 bbl. per day, with total production to 1961 of over 800,000 bbl. from this one well. The other three producing wells have yielded 300,000 to 400,000 bbl. each. Later wells flowed only water.

The oil is very waxy and must be heated and shipped in insulated trucks (Current, 1953). The field is still a steady producer, producing 105,598 bbl. in 1959 and 88,916 bbl. in 1960 (Thomas and Campbell, 1960).

Brennan Bottoms field. Total five wells, four oil producers. Production is from stratigraphic traps in the lower Green River formation from depths of 7,000-8,000 ft.

Discovery well in 1953 was drilled on seismic indications of northwest-plunging anticlinal nose, initially producing 213 bbl. per day, later (1957) 92 bbl. per day (Ismond, 1957).

Gusher fields (two small fields). Total four wells, two oil producers.

Production is from fracture zone in lower Green River formation, from depths of 8,500-9,500 ft.

The discovery well in the east field in 1950 produced 24 bbl. per day. Recompleted in 1958, it tested 45 bbl. per day, produced a total of 4,673 bbl. in 1959. The discovery in the west field in 1952 initially produced 23 bbl. per day.

Total production from both fields was 4,818 bbl. in 1959. Recent attempts to recomplete other wells in the area have been unsuccessful.

Gas

Commercial gas production is mainly from the Wasatch formation (Eocene), with minor production from the Mesaverde formation (Cretaceous), the Uinta formation (Eocene), and the Dakota formation (Cretaceous). The Mesaverde formation yields little present production but is considered an attractive objective. Since the initial exploration for oil in the Uinta basin, the emphasis has shifted from oil to gas exploration, particularly with the advent of transmission pipelines into the basin.

In early 1961 only the Red Wash-Walker Hollow fields were connected to a pipeline. Another pipeline to the southern part of the gas-producing area via Soldier Summit is under construction, and will connect the Uinta basin directly with the Salt Lake City market area. New pipeline facilities proposed and under construction will undoubtedly stimulate further gas exploration.

Gas production from the Tertiary sediments of the basin comes from stratigraphic traps, and the many separate fields in the Wasatch formation are probably genetically related throughout the basin. Current estimated gas reserves from the Uinta basin exceed 2 trillion cubic feet of recoverable gas.

Red Wash-Walker Hollow field. Twelve gas-producing wells, mainly on the eastern end of the field, produce from the Green River formation (Eocene).

The oil wells in the field produce considerable associated gas. A few shallow gas wells produce from the Uinta formation in the Walker Hollow portion of this field.

Bend field. Total of four wells, two gas producers, producing from Uinta formation.

The largest well, in 8-7s-22e, tested 4,225 M.c.f.d. in 1959 from a depth of about 3,000 ft.

Ashley field. One gas well produced only 536,336 cu. ft. of gas during 1929-1941 from the lower Morrison formation (Jurassic), from a depth of 1,430-75 ft. It was abandoned in 1941 when gas pressure decreased from 580 to 100 psi. (Kinney, 1955).

(The following fields are actually only units in a major production field in the Wasatch formation, pro-

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HOW, WHEN, AND WHERE TO BID

All bids must be submitted on "Invitation, Bid, and Acceptance Form No. GSA-R-414," which fully describes the property, states all terms and conditions and necessary instructions. Sealed bids will be received at GSA Business Service Center, Room 101, 1114 Commerce Street, Dallas, Texas, until 1:00 P.M., CST, January 23, 1962, at which place and time they will be publicly opened and read.

FOR THE INVITATION, BID, AND ACCEPTANCE FORM, write or call GSA Business Service Center, 1114 Commerce Street, Dallas 2, Texas. Further information can be obtained from the office listed below or call RIverside 8-5611, Extension 2131.

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ducing from isolated stratigraphic traps.)

Bitter Creek field. Total 10 wells, 8 gas producers. Production is from the Wasatch formation at depths of 4,800-5,500 ft. The early wells in 1957 produced 2 and 5 M.M.c.f., respectively from depths of 5,000-5,400 ft. A well completed in 1959 initially produced 17,500 M.c.f. from 4,800-5,200 ft.

Chapita Wells field. Total 23 wells, 8 gas producers, 1 oil. Production is from the Wasatch formation at a depth of about 5,100 ft. and the Mesaverde formation at depths of 8,200-8,300 ft.

Some oil is also produced from Wasatch and Mesaverde formations with the gas. The discovery well, completed in 1952, had an initial flow of 30 bbl. of oil per day, 5% water, and 1 M.M.c.f.d. gas from the Mesaverde formation. It was abandoned in 1955.

The second well, completed in 1955, produced 4,618 M.c.f. and 50 bbl. oil from the Wasatch formation in 4 days (Miller, 1957). Additional wells are planned for this area.

Ouray field. Total seven wells, five gas producers, one oil. The first wells were drilled in 1948, but all were dry.

In 1956 gas was produced from the Wasatch formation at 1,230 M.c.f.d. at a depth of 4,854 ft. Later wells produced gas from depths as deep as 6,345 ft., still in the Wasatch formation.

Oil is produced from the Green River formation at 3,560 ft. Gas wells in this field are shut in awaiting the new pipeline (Gillespie, 1957).

Southman Canyon field. Total six wells, one gas producer, two combined oil and gas producers. Gas is produced from both the Wasatch and Mesaverde formations with some oil production from the Mesaverde.

The single gas producer is in the Wasatch formation. It yielded 1,300 M.c.f.d. from 4,663-4,888 ft. (Picard, 1956). Another well produces gas from the Wasatch formation at 6,700-6,825 ft.

One of the combined oil and gas wells produces from the Mesaverde formation at 5,900-6,000 ft., initial-

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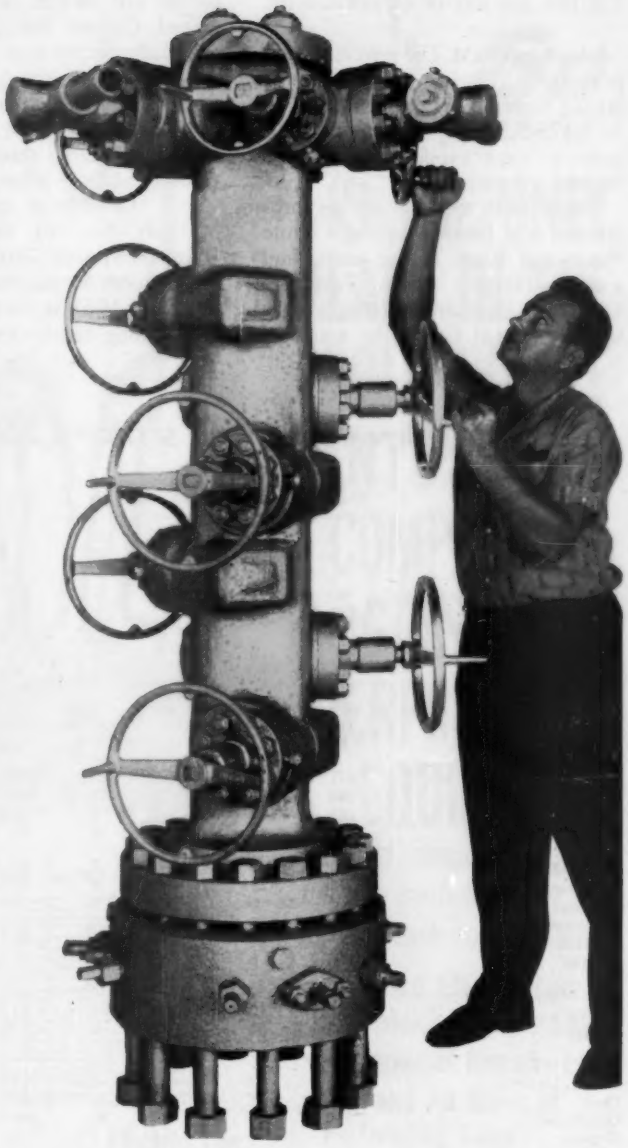

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ly flowing 4,700 M.c.f. of gas and 121 bbl. per day of oil condensate.

Island unit field. Three wells, all gas producers. This is a new field, producing from the Wasatch formation at 5,475-5,575 ft. The three wells have a total capacity of 24,000 M.c.f.d. of gas.

Other wells capable of gas production are located in the Coyote Wash and Rock House units, and a single Humble well in Township 11s-21e. Another interesting gas well is located far to the south of the known gas field of Uintah County, in 36-15s-22e, almost on the Grand County line. This well is especially interesting since it produced gas from the Dakota formation (Cretaceous). The well tests a total depth of 10,348 ft.

Now available through the Utah Geological and Mineralogical Survey is "Guidebook to the Geology of Utah (No. 16), Geology of the Bingham Mining District and Northern Oquirrh Mountains." The guidebook for 1961 is about the Kennecott mining district and promises to be a very interesting book.

Also available is a book just off the press, Bulletin No. 71 of the Utah Geological Survey, "The Mineral Resources of Uintah County." This book is the result of 2 years of extensive research and writing by Robert G. Pruitt, Jr., and reveals the important role minerals such as gilsonite, oil, gas, coal, phosphate, and oil shale will play in the economic future of the Uinta basin.

The book is available through UG&MS, Room 103, C.E. Bldg., Univ. of Utah, Salt Lake City 12.

November well score—4,268, was highest in 1961

	Total	Oil	Cond.	Gas	Dry	Service	Footage	Cum. wells 1961	Cum. footage 1961	Cable-tool comp.	D.D.
Alabama	9	8	0	0	1	0	106,558	42	472,259	0	0
Alaska	6	2	0	0	4	0	48,104	46	457,883	0	0
Arizona	1	0	0	0	1	0	6,332	20	50,513	0	0
Arkansas	60	33	0	3	20	4	210,048	486	1,798,902	0	0
California	228	180	0	9	38	1	817,190	1,719	7,240,780	0	17
Colorado	66	10	0	15	41	0	309,951	613	2,913,680	0	3
Florida	0	0	0	0	0	0	0	8	76,491	0	0
Georgia	0	0	0	0	0	0	0	1	4,500	0	0
Illinois	177	75	0	0	97	5	385,277	1,893	4,202,976	19	4
Indiana	90	40	0	0	50	0	153,348	724	1,093,888	62	1
Kansas	318	156	0	22	128	12	1,072,276	4,362	11,650,382	24	0
Kentucky	81	26	0	1	51	3	102,897	1,654	2,297,052	48	1
Louisiana	471	220	1	52	198	0	3,233,125	3,642	26,801,373	0	1
North	240	83	1	30	126	0	829,454	1,564	5,266,210	0	0
South	183	110	0	18	55	0	1,923,730	1,583	16,372,589	0	1
Offshore	48	27	0	4	17	0	479,941	495	5,162,574	0	0
Michigan	94	15	0	7	62	10	274,788	754	2,283,540	31	0
Mississippi	70	25	4	6	35	0	667,513	523	5,157,367	0	0
Missouri	0	0	0	0	0	0	0	35	60,244	0	0
Montana	42	23	0	0	19	0	225,356	371	1,998,067	0	0
Nebraska	88	26	0	0	61	1	419,436	908	4,154,905	0	0
Nevada	0	0	0	0	0	0	0	14	27,398	0	0
New Mexico	151	76	1	34	39	1	759,186	1,670	8,615,018	20	1
West	61	12	1	34	14	0	302,088	723	3,528,611	6	1
East	90	64	0	0	25	1	457,098	947	5,086,407	14	0
New York	23	13	0	0	0	10	31,050	403	583,674	23	0
North Dakota	26	13	0	0	13	0	147,128	238	1,478,688	0	0
Ohio	108	66	0	19	22	1	275,455	991	2,486,715	87	3
Oklahoma	500	235	8	47	140	70	1,966,301	5,280	18,160,097	93	12
Oregon	0	0	0	0	0	0	0	2	15,295	0	0
Pennsylvania	60	15	0	15	6	24	146,228	587	1,705,740	53	0
South Dakota	0	0	0	0	0	0	0	5	30,908	0	0
Tennessee	4	0	0	1	3	0	1,091	69	50,684	4	0
Texas	1,353	713	5	143	458	34	6,143,788	13,305	59,818,479	49	17
Dist. 1	83	46	0	8	29	0	229,865	849	2,296,542	0	4
Dist. 2	75	23	0	18	34	0	466,756	704	4,713,084	0	0
Dist. 3	135	50	0	24	59	2	965,153	1,081	7,352,792	0	0
Dist. 4	95	36	0	17	41	1	455,816	1,106	6,221,230	0	4
East (5 & 6)	91	48	5	6	32	0	565,357	1,062	5,638,310	0	0
Dist. 7-B	143	65	0	14	62	2	471,535	1,629	4,955,698	9	0
West (7-C & 8)	349	252	0	8	82	7	1,736,640	3,339	16,961,224	21	7
Dist. 9	281	150	0	8	103	20	765,191	2,456	6,551,194	19	2
Dist. 10	101	43	0	40	16	2	487,475	1,079	5,128,405	0	0
Utah	14	5	0	0	9	0	82,603	218	1,278,985	0	0
Virginia	0	0	0	0	0	0	0	2	8,004	0	0
Washington	0	0	0	0	0	0	0	11	44,404	0	0
West Virginia	140	15	0	112	13	0	363,546	1,008	2,493,125	124	0
Wisconsin	0	0	0	0	0	0	0	6	8,100	0	0
Wyoming	88	22	0	16	48	2	371,152	896	4,396,014	0	2
Total Nov. 1961	**4,268**	**2,012**	**19**	**502**	**1,557**	**178**	**18,319,727**	**42,506**	**173,916,130**	**637**	**62**
Total Oct. 1961	4,003	1,825	34	503	1,407	234	16,762,704	.....	.....	683	67
Cumulative 1961	**42,506**	**19,168**	**726**	**4,415**	**15,392**	**2,805**	**173,916,130**	.....	.....	**8,183**	**730**
Cumulative 1960	41,941	18,855	1,211	3,536	15,887	2,452	172,077,237	.....	.....	.....	.....

New Uinta basin gas discovery completed

Another gas discovery is reported in eastern Utah's Uinta basin area. The new well is Tidewater Oil Co.'s 1-X Horse Point unit in NW NE 14-16s-23e, Grand County.

This new well flowed 1,025 M.c.f.d. through 1¼-in. choke from Dakota Cretaceous perforations at 8,008-94 ft. Location is 3 miles southeast of Fence Canyon field. There had been no drilling between the two areas.

West of the new gasser 6 miles, Rip C. Underwood 1 Seagull-Federal, SE NW 13-16s-24e, flowed from 15-20 M.M.c.f.d. during tests in the Dakota. Drilling is now below 5,970 ft.

Kansas adds important wells

SEVERAL important developments featured Kansas exploration and field-well drilling last week.

Mull Drilling Co., Inc., and Walters Drilling Co. got state potential at the discovery well of new North Shiley field in Rush County. The 1 West, NE NW NW 31-19s-19w, 113 miles southwest of La-Crosse, made 146 bbl. of 40°-gravity oil per day with no water. Production is from Cherokee Pennsylvanian at 4,190-4,200 and 4,205-11 ft.

Barton, Rice. Thunderbird Drilling Inc. has two discoveries in these counties. In Barton County, 1 Steinert, NW NW SE 2-16s-15w, 11½ miles northwest of Hoisington, opens Lansing Pennsylvanian oil production. A gage of 42 bbl. per hour for 6 hours was reported, swabbing 1,400 ft. off bottom. Perforations are at 3,200-05 ft. The discovery is located about 1 mile north of Galatia field.

In Rice County, Thunderbird completed 2 Wellman "G" in NW SW SE 33-21s-9w in Rino Arbuckle field. The well pumped 39 bbl. of 41°-gravity oil per day plus 70% water from Simpson Ordovician perforations at 3,518-30 ft.

Stafford County. Arizona Oil Co. completed the discovery well of Macksville Townsite field at 1 Thurow in NE NW SW 15-24s-15w, located on the northeast edge of the

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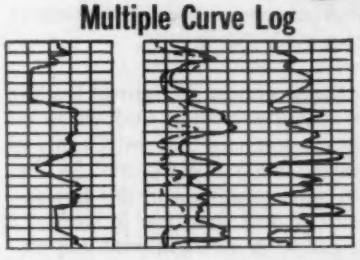

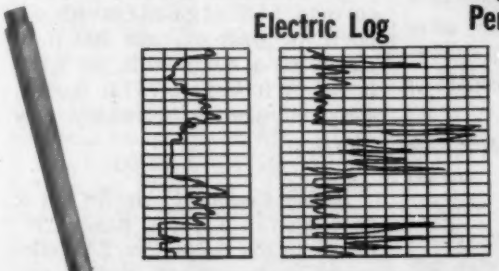

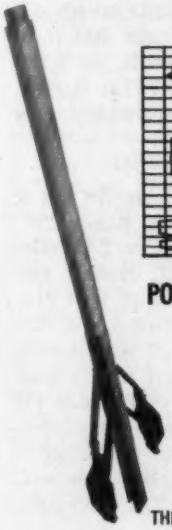

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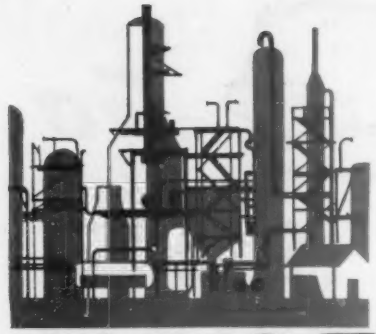

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town and 1 mile southwest of Nagel field. The well made 27 bbl. per day from Simpson perforations at 4,152-62 ft.

Petroleum, Inc., 1 Bear "B" in SW NW 17-25s-14w expanded Foley field. The well made 93 bbl. of oil per day plus 28% water from perforations in the Mississippi at 4,188-4,202 ft.

The 1 Mackley in SW SW NE 36-24s-14w confirmed Mississippian oil production at Southeast Kowalsky field. The well made 1,405 M.c.f.d. during drill-stem test at 4,017-40 ft. Oil flowed in 35 minutes. Recovery was 325 ft. free oil.

D. R. Lauck Oil Co. 1 Wilson in C NE NE 24-25s-15w is a new gasser southwest of Foley field. The well flowed 5,020 M.c.f.d. during drill-stem test in the Mississippi at 4,205-40 ft.

Pratt County. Continental Oil Co. is completing 2 J. Brehm, confirmation well to new Brehm field in SW SW SW 23-28s-13w. No gages are yet reported. Production is from Arbuckle at 4,422-32 ft. Continental is also drilling 1 Brehm in SW NE SW 23-28s-13w. The discovery well was 1 Brehm in SW SE SW 23-28s-13w. It flowed 205 bbl. of oil per day from Arbuckle perforations at completion in November from 4,423-33 ft.

Other events. Musgrove Drilling Co. has a new Viola Ordovician oil field in southern Stafford County at 1 Slade in SW NW SW 35-25s-12w, 1½ miles southeast of dry Bonham field. A drill stem test at 4,051-72 ft. got 10 ft. of slightly oil and gas-cut mud, 54 ft. of gas-cut muddy oil, 60 ft. of gassy oil, and 900 ft of gas. A test at 4,073-90 ft. got 3,180 ft. gas, 50 ft. free oil, 157 ft. muddy, gassy oil, and 8 ft. muddy, oily water.

Barber County. Champlin Oil & Refining Co. 1 Davis Ranch "N" in NE SE SW 4-34s-15w, 2¾ miles south of Platt field, flowed 648 M.c.f.d. from Mississippi at 4,714-4,830 ft. during drill-stem test. Recovery was 660 ft. of very heavily gas-cut mud and 180 ft. watery mud.

In Harper County, Tenneco Oil Co. confirmed Simpson oil production in Rex field at 1 Horton, 3 miles southeast of Gerber field in C NE NW 12-32s-5w, 11 miles southeast of Harper. A drill-stem test in the Simpson at 4,632-52 ft. got 2,540 ft. of free oil, 120 ft. of oil-cut mud, and 120 ft. of salt water. The pool discovery well, completed last November, was 1 King in C SE SW 1-32s-5w. It made 166 bbl. of oil per day from Simpson open hole at 4,633-39 ft.

Confirmations and extensions feature Kansas development

In Hodgeman County, Kansas, Sunray Mid-Continent Oil Co. completed 1 G. Miller in C SE NW 8-22s-22w, confirming Mississippian oil production at Hanston field.

The well made 174 bbl. of 33.6°-gravity oil per day with no water. Perforations were at 4,520-35 ft. This confirms the discovery well at 1 Miller estate, SW NE 8-22s-22w, completed in November for 198 bbl. per day from Mississippi at 4,486-4,513 ft.

Barton County. Nadel & Gussman et al. completed 2 Wood in NE NE NE 26-19s-13w, confirming West Fort Zarah field. The new well made 194 bbl. of oil daily. Gravity is 39.6°. Pay is Arbuckle open hole at 3,411-14 ft. The November discovery well was 1 Wood in NW NW NW 25-19s-13w. It made 239 bbl. of oil per day from open hole in the Arbuckle at 3,414-18 ft.

Ellis extension. D. G. Hansen extended West Pleasant field ½ mile east at 2 Giebler in SW SE NW 3-14s-20w. The well made 145 bbl. of 38°-gravity oil per day from Arbuckle at 3,836-59 ft. The new well lies ½ mile southwest of Pleasant field.

Third well added to Jenkins field in N. M.

A southeastern New Mexico Pennsylvanian field added its third oil producer. New well is Trice Production Co. 1 A. T. Hutcherson in northern Lea County, 6 miles northwest of Crossroads town in 10-9s-34e.

The well flowed 244 bbl. of oil per day on 14/64-in. choke from perforations at 9,601-6 ft. Well is one location southwest of field production.

November wildcat completions hit 843

State—	Total	Oil	Cond.	Gas	Dry	Footage	Cum. wells 1961	Cum. footage 1961
Alabama	1	0	0	0	1	6,656	9	93,125
Alaska	4	0	0	0	4	26,125	15	127,395
Arizona	1	0	0	0	1	6,332	12	36,884
Arkansas	9	0	0	0	9	37,145	99	395,030
California	25	0	0	1	24	154,507	249	1,591,135
Colorado	25	2	0	0	23	105,809	276	1,348,619
Florida	0	0	0	0	0	0	8	76,491
Georgia	0	0	0	0	0	0	1	4,500
Illinois	54	11	0	0	43	100,652	436	855,824
Indiana	17	4	0	0	13	30,396	192	264,131
Kansas	76	15	0	4	57	292,739	812	3,188,573
Kentucky	7	1	0	0	6	12,446	116	173,047
Louisiana	98	5	0	3	90	594,669	630	4,943,627
North	62	3	0	1	58	181,256	313	1,225,866
South	33	2	0	2	29	389,791	265	3,147,068
Offshore	3	0	0	0	3	23,622	52	570,693
Michigan	37	0	0	1	36	121,200	275	867,657
Mississippi	23	2	1	0	20	222,250	184	1,812,908
Missouri	0	0	0	0	0	0	34	58,850
Montana	12	0	0	0	12	53,036	170	868,576
Nebraska	53	2	0	0	51	249,439	456	2,134,089
Nevada	0	0	0	0	0	0	13	19,643
New Mexico	27	2	0	0	25	97,732	273	1,407,205
West	12	1	0	0	11	32,048	92	280,163
East	15	1	0	0	14	65,684	181	1,127,042
New York	0	0	0	0	0	0	18	56,032
North Dakota	7	1	0	0	6	43,405	67	434,081
Ohio	5	0	0	1	4	14,860	41	135,737
Oklahoma	38	5	1	4	28	250,185	484	2,582,770
Oregon	0	0	0	0	0	0	2	15,295
Pennsylvania	3	0	0	1	2	16,855	47	298,690
South Dakota	0	0	0	0	0	0	5	30,908
Tennessee	4	0	0	1	3	1,091	69	50,684
Texas	276	30	0	12	234	1,601,187	2,830	14,773,781
Dist 1	12	0	0	0	12	33,497	323	1,076,498
Dist. 2	25	0	0	3	22	157,247	212	1,469,697
Dist. 3	44	3	0	3	38	388,005	228	2,111,271
Dist. 4	45	5	0	4	36	207,556	311	1,795,454
East (5 & 6)	20	2	0	1	17	135,195	270	1,463,181
Dist. 7-B	31	5	0	0	26	114,160	445	1,561,612
West (7-C & 8)	70	10	0	0	60	375,425	660	3,332,725
Dist. 9	20	4	0	0	16	113,100	263	1,080,618
Dist. 10	9	1	0	1	7	77,002	118	882,725
Utah	8	0	0	0	8	48,782	100	588,086
Washington	0	0	0	0	0	0	11	44,404
West Virginia	0	0	0	0	0	0	8	66,300
Wisconsin	0	0	0	0	0	0	6	8,100
Wyoming	33	1	0	1	31	125,949	346	1,864,699
Total Nov. 1961	**843**	**81**	**2**	**29**	**731**	**4,213,447**	**8,294**	**41,216,876**
Total Oct. 1961	791	63	11	46	671	4,019,411	....	.....
Cum. 1961	**8,294**	**743**	**82**	**368**	**7,101**	**41,216,876**	....	.....
Cum. 1960	8,751	789	96	296	7,570	40,227,843	....	.....

New wells added in Sooner's Kingfisher

Oklahoma's Kingfisher play continues to move briskly with big wells added daily. United Producing Co. completed one well at East Hennessey, proved production at another, and was running casing at an offset at West Hennessey.

The 2 Prazak, C SW NE 30-19n-6w, flowed 348 bbl. of oil per day on 20/64-in. choke through open hole at 7,023-7,125 ft. in Meramec Mississippian. It made 522 bbl. per day on 24/64-in. choke from Manning Mississippian perforations at 6,804-12 and 6,821-29 ft.

The 1 Hickey, C SW SE 26-19n-6w, flowed 17 bbl. of oil per hour on 20/64-in. choke from open hole at 6,766-6,860 ft. It then made 187 bbl. in 12 hours on same choke.

The west Hennessey offset, 1 Wright Unit, C NE SW 16-19n-7w, ran a 1-hour test in Red Fork Pennsylvanian at 6,741-67 ft. Gas surfaced in 2 minutes at 1,250 M.c.f.d.

Jack Choate dually completed 1 Iven in C SW NW 36-19n-6w flowing 78 bbl. of oil in 8½ hours through 20/64-in. choke from Os-

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In Both Primary and Secondary Recovery, You Can Depend on

THOMPSON ROD PUMPS

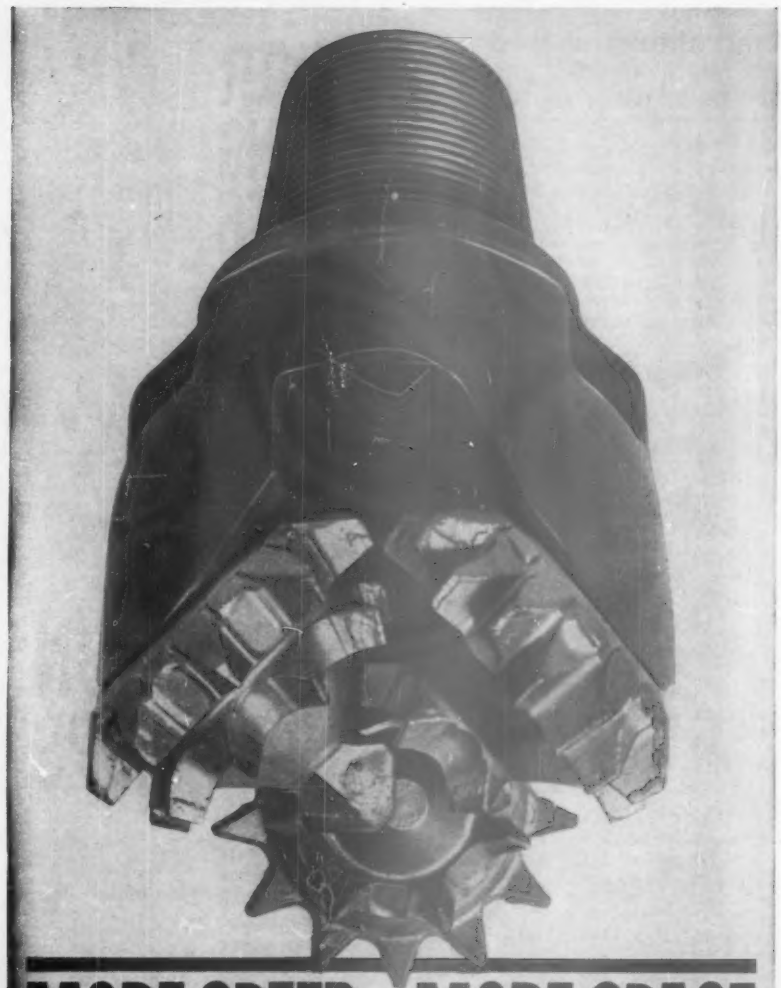
Solve down-hole pump problems by standardizing on Thompson Rod Pumps—they run longer, more economically. You can count on reliable performance!

OVERSIZE PUMPS:
1 5/16" Bore for 2" Tubing,
2 1/16" Bore for 2½" Tubing.

STANDARD:
1 1/16" 1¾"
1¼" 2"
1½" 2½"

Thompson PUMP COMPANY

DRAWER 591 • OKMULGEE, OKLA.



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AIR FRANCE CARGO

wego perforations at 6,207-17 ft. Location is between East Hennessey and Southeast College Corner fields. From Meramec at 6,678-6,820 ft. the well flowed 56 bbl. in 6 hours through 15/64-in. choke through open hole.

Ohio producer joins Trempealeau play

In Ohio, a 400 barrel oil per day producer has been added to the fast moving Trempealeau play in Morrow County. In a production test 5 days after treatment, Atlas Exploration Corp. reported the second well on the J. & R. Wolfinger tract, Section 3, Cardington Township, is flowing 400 barrels oil per day through ¾-in. choke. A third test was dry. Total depths were 3,024 and 3,125 respectively.

In Canaan Township, United Prod. Co. completed the 1 L. & R. Bader, and 1 L. & M. Hall in Section 28. Reported initial production after treatment was 21 barrels oil per day and 10 barrels oil per day with total depths of 3,140 and 3,203.

In the general area new pool testing is under way in Gilead Township Morrow County; Atlas Exploration Corp. 1 Henry McWhirk, Section 11 and Grantley County 1 J. W. Shaffer, Section 10. Also, W. E. Shrider 1 Jerome Ault, Section 36, Claridon Township, Marion County.

New discovery fills another gap in Texas' Edwards chain

Another connecting link has been forged for the chain of deep Edwards fields being stretched across northern Karnes County, in Texas' central coastal region.

The new link is the Viking Drilling Co. and Jocelyn Varn Oil Co. joint discovery well completed with an absolute open-flow potential rating of 3,700 M.c.f.d. of gas from Edwards lime perforations at 11,076-11,107 ft.

The well, 1 Tom Clark, 7 miles southwest of Hobson, splits the 12-mile gap between the present east end of the elongated Fashing field, on the southwest, and Big John field, 6 miles northeast.

The two easternmost wells at Fashing and Big John field are oil

VERSATILE

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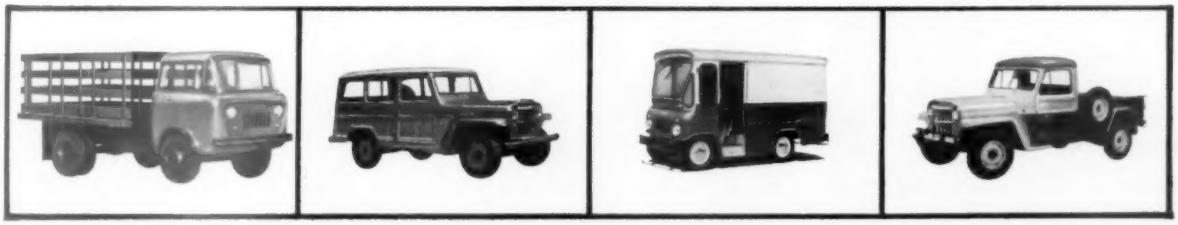
WILLYS MOTORS, INC., TOLEDO, OHIO. ONE OF THE GROWING KAISER INDUSTRIES



Clean Strip Jet in position to perforate.

After perforating, Clean Strip carrier is shown being retrieved.

WELEX GLASS JET DATA

Choose your weapons for HIGHER PRODUCTION in every type completion

TUBINGLESS COMPLETIONS

Clean Strip Jet

- No debris left in the hole
- No plugged perforations
- Faster running time
- Random sections can be blanked off
- No caustic or acid necessary
- Well on production quicker

THROUGH-TUBING COMPLETIONS

Clean Strip Jet

- No debris left in the hole
- No plugged perforations
- Faster running time
- Random sections can be blanked off
- No caustic or acid necessary
- Well on production quicker
- Sidekicker provides optimum clearance

Glass Swing-Jet

- Glass charges reduce debris
- Gun design provides optimum clearance
- Gun design permits larger charge to pass through tubing, resulting in maximum penetration and hole size

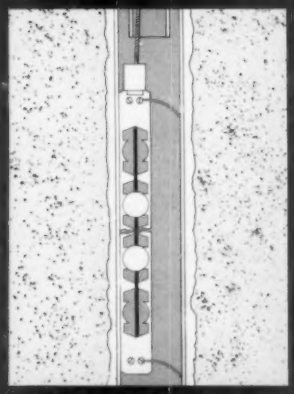
STANDARD COMPLETIONS

Clean Strip Jet

- No debris left in hole
- No plugged perforations
- Faster running time
- Random sections can be blanked off
- No caustic or acid necessary
- Well on production quicker
- Sidekicker provides optimum clearance

Hornet-Jet

- No debris left in the hole
- No plugged perforations
- Random sections can be blanked off
- No caustic or acid necessary
- Well on production quicker
- Larger charge delivers deep penetration



In through-tubing completions the Welex Clean Strip Jet is used with the Welex Sidekicker to decentralize the charge for maximum penetration.

Swing-Jet and Hornet-Jet are trademarks of Jet Research Center, Inc.

PRODUCTION DATA

	1 11/16" Clean Strip Jet	2 1/8" Clean Strip Jet	1 11/16" Glass Swing-Jet
Clearance (inches)	½	½	½
Pressure Rating	15,000	13,000	18,000
Hole Size (inches)	0.27	0.49	0.40
Penetration (inches)	5.49*	7.13*	7.63*
Well Flow Index	1.09	1.12	1.18

* Shot into ⅜" steel, ¾" cement, Berea sandstone

CLEAN STRIP FILL UP DATA

Gun OD	Pipe OD	Fill Up For 40 Charges
1 11/16"	2 7/8"	7.85"
1 11/16"	5½"	1.95"
2 1/8"	3½"	8.65"
2 1/8"	5½"	3.25"

FIRST FROM WELEX

Debris-free

Glass Jet Perforator for Tubingless and Thru-Tubing Completions

The smaller the casing, the greater the possibility of damage from junk left in the hole when perforating. Now Welex is first with a completely debris-free, high performance glass jet perforator to run in or through tubing or casing as small as 2-3/8" and 2-7/8" OD.

It is called the Welex Clean Strip Jet. After firing, the glass capsule becomes a mere handful of harmless sand, and the carrier is fully-retrievable (through a 1-25/32" seating nipple).

Never before has a completely junk-free perforating gun been available for slim hole or through-tubing completions.

As shown at far left, Welex Glass Charges are available for the Welex Swing-Jet and Welex Hornet-Jet as well as for the Welex Clean Strip Jet. Here is how these glass jet guns are used:

For tubingless completions, the Welex Clean Strip Jet is available in two sizes: the 1-11/16" OD gun for perforating 2-3/8" and 2-7/8" OD tubing (or casing) and the 2-1/8" OD gun for perforating 3-1/2" OD and larger tubing (or casing).

For through-tubing completions, you have a choice of the Welex Clean Strip Jet and the Welex Glass Charge Swing-Jet. In 3-1/2" OD casing and larger, the Clean Strip Jet is always run with the Welex Sidekicker. The Sidekicker positions the glass charge so that it hugs the casing wall (the charge axis lies along a chord of the circle described by the casing). This provides optimum clearance for maximum penetration and hole size. The 1-11/16" Clean Strip Jet is used in or through 2-3/8" OD tubing and in 2-7/8" tubing; and the 2-1/8" Clean Strip Jet is used in 3-1/2" OD tubing (or casing) and through 2-7/8" OD tubing.

For standard completions, either size Clean Strip Jet with Sidekicker is recommended for maximum performance. The Welex Hornet-Jet can also be used. It fires the same glass charges as the Welex Swing-Jet, but has a retrievable steel carrier.

The high performance delivered by the Welex line of glass charge perforators makes them your best choice for slim hole or standard completions. Choose your weapons! Glass Charge Clean Strip Jet, Swing-Jet or Hornet-Jet give you more for your completion dollar.

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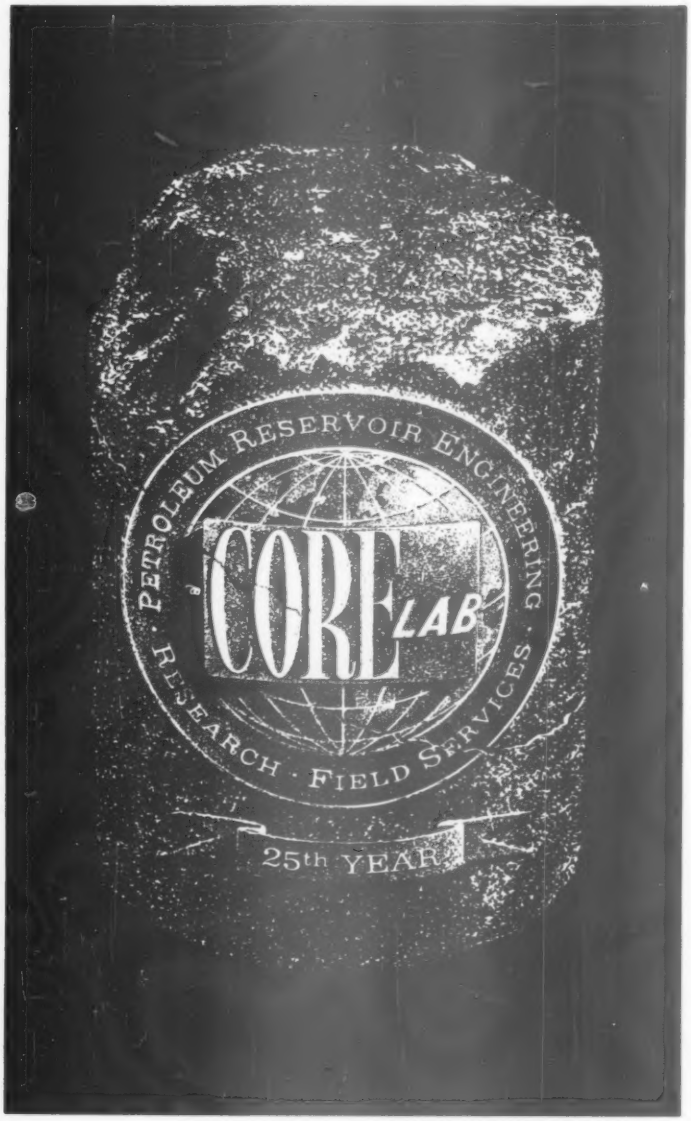

UNITED STATES

CANADA

SOUTH AMERICA

EUROPE

AFRICA

Pacemaker for twenty-five years of petroleum reservoir engineering services . . . And as we pass the quarter-century mark, more people in more places are using more Core Lab data than ever before.

productive in contrast to the gas production of the Viking-Jocelyn Varn discovery. Main production at Fashing, however, is gas.

Flow of the new well through 16/64-in. choke was at the rate of 2,690 M.c.f.d. with pressure of 1,773 psi. Flow through 10/64-in. choke was 1,492 M.c.f.d. with pressure of 2,584 psi. Shut-in pressure is 3,765 psi. at the top.

Eastern Louisiana adds new strike in Concordia Parish

A new Wilcox oil discovery is reported in Concordia Parish, eastern Louisiana.

Its discovery well is Olin Oil & Gas Corp. 1 Fred Conn, in 22-4n-6e, 3 miles northwest of Acme. Nearest other production is slightly more than 2 miles east of Bee Brake field.

Olin's well flowed 87 bbl. of 48.8-gravity oil daily through 14/64-in. choke with b.s. and w. cutting 36% of total fluid. Flowing pressure was 200 psi.

The Wilcox pay is perforated at 6,608-11 ft. with bottom of the hole at 6,760 ft.

Field name will be Lake Curry.

Fort Bend County, Texas, wildcat tops new Frio pay

New Frio production has been found in an exploratory well drilled off the west side of Needville field, in southwestern Fort Bend County, Texas Gulf Coast. Faulting separates it from Needville production, and a separate field designation is expected.

The well, drilled by Gulfcoast Leaseholds, Inc., and Charles B. Marino, joint operators, is rated good for 225 bbl. of oil daily with flow restricted to 15/64-in. choke. Flowing pressure is 880 psi.

Production is from a 4-ft. perforated interval at 6,305-9 ft. A shallower sand logged at 5,285-95 ft. had indications of good gas production, and may be the objective of another well being planned by the same operators.

Location of the new area is 2½ miles southwest of Needville townsite.

from the NORTH POLE to the SOUTH SEAS

the DECCA NAVIGATOR

more than 20 mobile Decca chains are currently deployed throughout the world to cover air, marine and ground survey and exploration projects, providing the means of integrating land, sea and air operations. Recent developments have substantially improved the portability of the transmitting stations, which, with the receiving equipment, are simple to operate and interpret. Little maintenance is required and the system can be manned by non-specialists. The Decca service of men and equipment is available anywhere in the world at short notice. No other system provides continuous, high-accuracy position fixing on land or off-shore, with such ease and flexibility of operation under any climatic conditions. And, of course, over 7,000 ships and aircraft use the permanent Decca chains in Europe and Canada.

MOBILE CHAINS FOR AIR, SEA & LAND EXPLORATION & SURVEY

THE DECCA NAVIGATOR CO. LTD. LONDON, ENGLAND

November multiple completions

	Dual							Triple						
	Oil		Gas			Comb.		Oil		Gas			Comb.	
	Zones	Holes	Zones	Holes	Holes	Gas	Oil	Zones	Holes	Zones	Holes	Holes	Gas	Oil
Arkansas	...	...	2	1	...	...	...	...	...	...	...	...	...	...
California	...	...	4	2	...	...	...	...	...	...	...	...	...	...
Colorado	...	...	2	1	...	...	...	...	...	...	...	...	...	...
Kansas	12	6	...	...	1	1	1	3	1	...	...	...	...	...
Louisiana	130	65	20	10	10	10	10	3	1	18	6	1	1	2
North	10	5	8	4	1	1	1	...	...	6	2	...	...	...
South	94	47	8	4	8	8	8	...	...	6	2	...	...	...
Offshore	26	13	4	2	1	1	1	3	1	6	2	1	1	2
Mississippi	2	1	2	1	...	...	...	...	...	...	...	...	...	...
New Mexico	8	4	6	3	...	...	...	3	1	...	...	1	1	2
Oklahoma	72	36	4	2	4	4	4	3	1	24	8	...	...	...
Texas*	120	60	46	23	14	14	14	18	6	24	8	2	2	4
Dist. 1	...	...	6	3	...	...	...	...	...	...	...	...	...	...
Dist. 2	8	4	2	1	...	...	...	...	...	...	...	...	...	...
Dist. 3	14	7	28	14	2	2	2	...	...	9	3	...	...	...
Dist. 4	48	24	6	3	2	2	2	12	4	9	3	1	1	2
East (5 & 6)	16	8	...	...	...	...	...	...	...	6	2	...	...	...
Dist. 7-B	...	...	2	1	...	...	...	...	...	...	...	...	...	...
West (7-C & 8)	26	13	2	1	7	7	7	6	2	...	...	...	...	...
Dist. 9	6	3	...	...	2	2	2	...	...	...	...	1	1	2
Dist. 10	2	1	...	...	1	1	1	...	...	...	...	...	...	...
Wyoming	6	3	2	1	...	...	...	...	...	...	...	...	...	...
Total	**350**	**175**	**88**	**44**	**29**	**29**	**29**	**30**	**10**	**66**	**22**	**4**	**4**	**8**

Total multiples, 291; total duals, 248; total triples, 36; total quad., 5; total quin., 1; and total septuple 1.

*Texas Dist. 4—1 quin. (5 gas); Dist. 3—1 septuple (7 gas); Dist 3—1 quad. (2 oil, 2 gas); Dist. 4—3 quad. (12 gas); West Texas—1 quad. (4 oil).

November footage breakdown

State—	Field wells					State—	Wildcats			
	Oil	Cond.	Gas	Dry	Service		Oil	Cond.	Gas	Dry
Alabama	99,902	...	...	...	...	Alabama	...	...	...	6,656
Alaska	21,979	...	...	...	...	Alaska	...	...	...	26,125
Arizona	...	...	...	...	...	Arizona	...	...	...	6,332
Arkansas	104,959	...	19,304	38,170	10,470	Arkansas	...	...	...	37,145
California	476,065	...	68,031	115,122	3,465	California	...	...	6,500	148,007
Colorado	36,990	...	83,538	83,614	...	Colorado	4,611	...	...	101,198
Illinois	169,896	...	...	113,329	1,400	Illinois	29,651	...	...	71,001
Indiana	63,587	...	...	59,365	...	Indiana	7,049	...	...	23,347
Kansas	431,770	...	64,317	263,248	20,202	Kansas	60,005	...	16,807	215,927
Kentucky	34,713	...	635	52,565	2,538	Kentucky	950	...	...	11,496
Louisiana	1,584,423	6,975	359,791	687,267	...	Louisiana	37,787	...	32,545	524,337
North	213,591	6,975	139,577	288,055	...	North	10,412	...	9,095	161,749
South	1,101,720	...	174,996	257,223	...	South	27,375	...	23,450	338,966
Offshore	269,112	...	45,218	141,989	...	Offshore	...	...	...	23,622
Michigan	36,215	...	17,081	73,176	27,116	Michigan	...	...	5,685	115,515
Mississippi	201,198	35,323	78,362	130,380	...	Mississippi	28,044	10,650	...	183,556
Montana	130,825	...	...	41,495	...	Montana	...	...	...	53,036
Nebraska	111,953	...	...	54,429	3,615	Nebraska	8,638	...	...	240,801
New Mexico	390,074	6,865	183,516	80,339	660	New Mexico	19,266	...	...	78,466
West	58,976	6,865	183,516	20,683	...	West	6,701	...	...	25,347
East	331,098	...	...	59,656	660	East	12,565	...	...	53,119
New York	17,550	...	...	...	13,500	New York	...	...	...	...
North Dakota	63,398	...	...	40,325	...	North Dakota	11,092	...	...	32,313
Ohio	169,605	...	55,259	34,631	1,100	Ohio	...	...	2,606	12,254
Oklahoma	844,897	51,551	254,754	444,378	120,536	Oklahoma	31,990	9,395	24,331	184,469
Pennsylvania	25,425	...	46,157	18,887	38,904	Pennsylvania	...	...	7,960	8,895
Tennessee	...	...	...	...	...	Tennessee	...	...	231	860
Texas	2,868,105	44,957	708,624	818,598	102,317	Texas	182,564	...	92,337	1,326,286
Dist. 1	100,972	...	47,209	48,187	...	Dist. 1	...	...	...	33,497
Dist. 2	146,695	...	94,690	68,124	...	Dist. 2	...	...	16,552	140,695
Dist. 3	287,841	...	131,904	143,603	13,800	Dist. 3	18,620	...	31,548	337,837
Dist. 4	126,876	...	91,429	28,254	1,701	Dist. 4	30,855	...	27,743	148,958
East (5 & 6)	286,436	44,957	29,266	69,503	...	East (5 & 6)	13,249	...	7,294	114,652
Dist. 7-B	196,009	...	55,640	98,582	7,144	Dist. 7-B	18,877	...	...	95,283
West (7-C & 8)	1,164,217	...	59,015	113,583	24,400	West (7-C & 8)	59,410	...	...	316,015
Dist. 9	358,910	...	49,157	195,387	48,637	Dist. 9	31,253	...	...	81,847
Dist. 10	200,149	...	150,314	53,375	6,635	Dist. 10	10,300	...	9,200	57,502
Utah	27,707	...	...	6,114	...	Utah	...	...	...	48,782
West Virginia	29,752	...	301,503	32,291	...	West Virginia	...	...	...	...
Wyoming	98,235	...	99,317	40,810	6,841	Wyoming	...	...	14,000	111,949
Total Nov. 1961	8,039,223	145,671	2,340,189	3,228,533	352,664		421,647	20,045	203,002	3,568,753

PERSONALS

Richard R. Von Hagen, president of Lloyd Corp., Ltd., has been elected president of Western Oil and Gas Association for 1962. He succeeds **Howard Vesper,** president of Standard Oil Co. of California, Western Operations, Inc. **George F. Getty II,** president of Tidewater Oil Co., was re-elected first vice president; **Harold C. Morton,** partner in Morton & Dolley, was elected second vice president; and **Stuart H. Durkee,** vice president and treasurer of Superior Oil Co., was re-elected treasurer. New board members are **Richard E. Faggioli,** area manager for Humble Oil & Refining Co., and **R. J. Stephens,** general manager, Kern Oil California, Ltd.

VON HAGEN

Raymond B. Aufmuth has been named vice president, engineering, for Arthur G. McKee & Co.'s refinery division. He will headquarter in Cleveland. Aufmuth will be in charge of engineering operations in the petroleum, chemical, and petrochemical fields. He succeeds **William B. Hudson,** recently promoted to executive vice president of the refinery division.

Wade J. Moore, area geologist in Calgary for Amurex Oil Co., Canadian subsidiary of Murphy Corp., has been transferred to Denver as division geologist for Murphy.

Peter C. Bawden, Peter Bawden Drilling, Ltd., Calgary, has been elected 1962 president of Canadian Association of Oilwell Drilling Contractors. He succeeds **R. H. Bullied,** Cascade Drilling Co., Calgary. **W. M. Booth,** Commonwealth Drilling Co., has been named vice president. Seven new directors were named by the association. They include Booth; **J. V. Drumheller,** Big Horn Drilling, Ltd.; **Glen Watson,** CanAmerican Drilling, Ltd.; **J. B. Coultis,** Coultis Drilling, Ltd.; **D. K. Gunderson,** Double-A Drilling Co.; **Dale Simmons,** Pennant Drilling Co.; and **Ken Moss,** Reading & Bates Drilling Co., Ltd.

Harry A. Hassan, vice president of Sinclair Oil & Gas Co., will retire at the end of the year. Hassan has been headquartered in Houston since 1952.

Robert H. Huey, vice president of Drilling & Exploration Co., Inc., Dallas, has been elected a director of the company. Huey has been with Drilexco since 1945.

A. E. C. Drake is scheduled to become deputy chairman of British Petroleum Co. January 1. He will succeed **Sir Harold Snow,** who is retiring as deputy chairman but will continue as a director of the company.

Carlos M. Creamer, assistant marketing adviser for South America for Standard Oil Co. (N. J.), has been promoted to marketing adviser for the Western Hemisphere. He succeeds **H. S. Wilson,** who is on leave of absence and will soon retire. Creamer has been with the Jersey companies for over 23 years.

Eugene S. Doyle has joined Texas Crude Oil Co. as production superintendent on the New Orleans district staff. Doyle had been production superintendent for Rimrock Tidelands, Inc., in Shreveport, La.

Richard N. Jolly has been promoted to engineering associate in Jersey Production Research Co.'s geophysical - research division. He has been with the Standard Oil Co. (N. J.) companies since 1940.

Carl D. Drescher has been named president of Sinclair International Oil Co., new Sinclair Oil Corp. subsidiary. **L. D. Hines** has been appointed executive vice president of the company. Other officers will be **T. P. Conlon,** manager of crude and product sales; **James Hillman,** Western Hemisphere representative in New York; and **Robert La Force,** European representative with headquarters in Paris. Sinclair is consolidating its foreign marketing activities under the new company.

M. E. Montrose, Houston, has been elected president of Hughes Tool Co.'s oil tool division. He will continue as senior vice president of Hughes Tool. Also, **Raymond M. Holliday,** Houston, has advanced to executive vice president of Hughes Tool. Holliday will continue as financial vice president of the oil tool division. Promotion of Montrose is a move toward further diversification and expansion of the oil tool division within the oil, mining, construction, and allied industries, the company said. It gives the division increased autonomy within Hughes Tool. Montrose has been with Hughes since 1949. He was vice president, sales, before being named a senior vice president in 1959.

MONTROSE

Guy W. Joyce, district geologist in Lake Charles, La., for Union Texas Natural Gas Corp., has been named district manager of exploration and district geologist for southwestern Louisiana. He will continue to headquarter in Lake Charles. **M. J. Stewart,** senior geologist in the Houston office, will move to New Orleans as district manager of exploration and district geologist for southeastern Louisiana.

Fred A. Hildenbrand has been named Canadian regional exploration manager for Atlantic Refining Co. Others appointed to the new region include **Ronald W. Hartwell,** district geologist of northern Alberta; **John M. Sweet,** district geologist for British Columbia and the Northwest Territories; **A. D. Cumming,** district geologist, southern Alberta and Saskatchewan; **James R. Souter,** regional stratigrapher; **John Hodgkinson,** district geophysicist for Alberta and Saskatchewan; **Jerry D. Stafford,** regional operations manager; and **C. B. Ringeisen,** regional land manager.

V. H. Hartmann, manager of Olin Mathieson Corp.'s Marion, Ill., plant, has been named manager of the Doe Run plant in Brandenburg, Ky. He succeeds **C. J. Thomas,** who has resigned.

NPC names soviet export study group

J. Ed Warren, Cities Service Co. president, New York, will head National Petroleum Council's new committee studying the impact of oil exports from the soviet bloc.

The study is made at the request of the Interior Department. Jerome J. O'Brien, director of the Office of Oil and Gas, will be government co-chairman.

Walter S. Hallanan, NPC chairman, has appointed 23 oil men to the committee. Besides Warren, committee officers will be W. W. Keeler, executive vice president of Phillips Petroleum Co., Bartlesville, Okla., vice chairman, and Vincent M. Brown, NPC staff, secretary.

Other oil industry members are:

Robert O. Anderson, Hondo Oil & Gas Co., Roswell, N. M.; Reid Brazell, Leonard Refineries, Alma, Mich.; E. D. Brockett, Gulf Oil Corp., Pittsburgh; William P. Clements, Jr., Southeastern Drilling Corp., Dallas; Harold Decker, Highland Oil Co., Houston; J. C. Donnell II, Ohio Oil Co., Findlay, Ohio; R. G. Follis, Standard Oil Co. of California, San Francisco; and George F. Getty II, Tidewater Oil Co., Los Angeles.

Also, Augustus C. Long, Texaco, New York; L. F. McCollum, Continental Oil Co., Houston; B. L. Majewski, Signal Perfect Fuels, Inc., Chicago; J. Howard Marshall, Union Texas Natural Gas Corp., Houston; Albert Nickerson, Socony Mobil Oil Co., New York; M. J. Rathbone, Standard Oil Co. (N. J.), New York; M. H. Robineau, Frontier Refining Co., Denver; Monroe E. Spaght, Shell Oil Co., New York; E. L. Steiniger, Sinclair Oil Corp., New York; Henderson Supplee, Jr., Atlantic Refining Co., Philadelphia; John E. Swearingen, Standard Oil Co. (Ind.), Chicago; and Robert E. Windfohr, Nash, Windfohr & Brown, Fort Worth.

J. Ed Warren
. . . will direct Russian study.

G. Thomas Shantz has been named to the new position of manager of petroleum industry sales in Olin Mathieson Chemical Corp.'s chemicals division. Shantz had been product manager, petroleum chemicals. He will continue to headquarter in Baltimore. The appointment is part of a reorganization of Olin's industrial - chemical marketing department.

E. L. (Ted) Fitzgerald, a senior geologist with Pan American Petroleum Corp., has joined Geophoto Services, Ltd., in Calgary as a senior geologist.

B. G. Casteel, project coordination engineer with DX Sunray Oil Co. in Tulsa, has been promoted to chief process engineer with Suntide Refining Co. in Corpus Christi, Tex.

George Mayes, director of purchasing and transportation for Tennessee Gas Transmission Co., **R. E. McGee,** treasurer, and **Elden P. Priebe,** controller, have been elected vice presidents of the firm.

R. H. Gray has succeeded **A. P. Rowland** as Lone Star Gas Co. vice president in Fort Worth. Rowland recently retired.

John F. Schomaker, Jr., senior engineer in charge of Panhandle Eastern Pipe Line Co.'s research division, has been named assistant chief engineer for the company. **Jack M. Ranck,** supervisory engineer in charge of test and development, will succeed Schomaker. In Panhandle's pipeline division, **Roy Lunday,** Liberal, Kans., district superintendent, has been named Elkhart, Kans., district superintendent. He succeeds **I. K. Grantham,** who has retired. **W. R. Newton,** assistant superintendent in Liberal, has been named superintendent there. **James K. Bryan** will succeed Newton. **Joe Adams** has been named assistant district superintendent in Jackson, Mich.

J. R. Hollis, vice president of General American Pipe Line Co., Dallas, has been elected president of the company. He succeeds **J. H. Barnes,** who has retired after 25 years with the firm. **J. S. Dykes,** secretary-treasurer, has moved up to succeed Hollis as vice president. **J. D. Bullock** has been named secretary-treasurer. Hollis has been with the pipeline company, a subsidiary of General American Oil Co. of Texas, for 25 years.

J. M. Kendrick, district land man for Pan American Petroleum Corp., has been transferred to Tyler, Tex., from Lubbock, Tex.

John E. Elliott, Austin, Tex., consultant, has been named 1962 recipient of AIME's Anthony F. Lucas gold medal. The medal will be presented at AIME's annual banquet February 21 in New York. Elliott will be cited for his pioneering work with design and use of formation core barrels. Elliott has been active in the industry since 1911. He went into consulting work in 1921 after serving with Associated Oil Co., Caribbean Petroleum Co., Royal Dutch Petroleum group, and Stanford University. Since the 1920's he has headed Elliott Core Drilling Co., been a partner in Elliott & Merritt, consulting geologists, and worked as an independent consultant. He is a past vice president of American Association of Petroleum Geologists.

D. T. (Dan) MacDonald, Goliad Oil & Gas Co., has been elected president of the Canadian Natural Gas Processing Association. Other 1962 officers are **A. H. Denny,** Pan American Petroleum Corp., vice president; **W. Humphries,** Canadian Pacific Oil & Gas Co., secretary; and **W. J. [illegible]nan,** Shell Oil Co., treasurer. **K. Milne,** Home Oil Co., Ltd.; **W. Sage,** Imperial Oil Ltd.; and **Guy Sutherland,** Tenneco Oil Co., have been elected to 2-year terms as association directors.

Dr. Humberto Penaloza, a director of Venezuelan Petroleum Corp. and adviser to the Venezuelan Ministry of Mines and Hydrocarbons, has been named Venezuelan representative on the board of governors of the Organization of Petroleum Exporting Countries. He succeeds **Dr. Alfredo Tarre Murzi,** who resigned from the post.

D. L. Connelly, Warren Petroleum Corp., Houston, has been re-elected president of Mid-Continent Oil and Gas Association, and **J. Clyde Tomlinson,** Longview, Tex., independent operator, has been elected vice president for Texas. Tomlinson was named to

CONNELLY

TOMLINSON

succeed **Estill S. Heyser, Jr.,** Heyser & Heard, Dallas, at the group's recent meeting in Tulsa. All other state vice presidents were re-elected. A new executive committee has been set up by the association in an attempt to strengthen legislative efforts in Washington. The committee will control the group between annual directors' meetings. Members are: **E. F. Bullard,** Pan American Petroleum Corp., Tulsa; **H. O. Harder,** Sunray Mid-Continent Oil Co., Tulsa; **E. H. McCollough,** Amerada Petroleum Corp., Tulsa; **William H. Morris,** Sinclair Oil & Gas Co., Tulsa; **John M. Houchin,** Phillips Petroleum Co., Bartlesville, Okla.; **Gentry Lee,** Cities Service Petroleum Co., Bartlesville; **C. C. Irby,** Sohio Petroleum Co., Oklahoma City; **W. L. Goldston,** Goldston Oil Corp., Houston; **C. B. Barrett,** Texaco, Houston; **H. F. Beardmore,** Gulf Oil Corp., Houston; **Morgan J. Davis,** Humble, Houston; **C. A. Perlitz, Jr.,** Continental Oil Co., Houston; **E. B. Miller, Jr.,** Tidewater Oil Co., Houston; **J. L. Morris,** Pure Oil Co., Houston. Also, **W. A. Alexander,** Shell Oil Co., Denver; **Glenn Bish,** Ohio Oil Co., Findlay, Ohio; **W. Dow Hamm,** Atlantic Refining Co., Dallas; **Jake L. Hamon,** Dallas independent; **Tom F. Hill,** Sun Oil Co., Dallas; **C. H. Murphy, Jr.,** Murphy Corp., El Dorado, Ark.; **K. H. Shaffer,** California Co., New Orleans; **W. M. Vaughey,** Jackson, Miss., independent; **Henry L. Waszkowski, Jr.,** Mobil Oil Co., New York; **L. Lee Welch,** Vincent & Welch, Lake Charles, La.; and **Joe T. Dickerson,** association executive vice president, Washington.

Anibal R. Martinez, geologist with Creole Petroleum Corp., has joined the staff of the Organization of Petroleum Exporting Countries. He will become head of the OPEC executive department, Geneva, Switzerland, in January. At OPEC's recent conference in Tehran the legal, economic, and financial sections were transferred from the technical to the executive department (OGJ, Nov. 6, 1961).

Richard L. Blunden, formerly with Honolulu Oil Corp. in San Francisco, has moved to Tulsa as gas marketing superintendent for Pan American Petroleum Corp.

Bob Thiede, operations supervisor in alcohol and white oil at Humble's Bayway refinery, Linden, N. J., has been given a 2-year loan assignment with Standard-Vacuum Oil Co. He will go to the Philippines early next month as assistant to the process superintendent of the Bataan refinery. Thiede had been at Bayway since 1944. At Bayway, **Bob Lynch,** staff engineer, has been given a loan assignment as unit supervisor with the alcohol-ethylene division.

DEATHS

Ralph Viersen, 71, Okmulgee, Okla., independent producer and contractor, died December 13 while on a visit to El Cajon, Calif.

Herbert E. Linden, 76, consulting engineer and founder of Oil Shale Corp., died December 13 at his home in Los Angeles. Linden was president of Oil Shale until last May when he was named chairman of the executive committee.

William W. Lowe, 74, retired director of Cities Service Co., died last week at his home in Ormand Beach, Fla. Lowe joined Cities Service as an engineer in 1912. He was vice president and general manager of Cities Service Refining Corp. in the 1940's when the Lake Charles, La., refinery was built. When he retired in 1948 he was a vice president of Cities Service Petroleum, Inc., and president of Wolverine Pipe Line Co.

James A. Boland, 76, Evansville, Ind., independent operator, died December 13 in Evansville after suffering a heart attack.

A. E. (Gene) Owens, 56, Depew, Okla., a drilling superintendent for Mabob Oil Co., died December 17 in a Tulsa hospital.

Fred Charles Langenkamp, 75, retired right-of-way agent for Service Pipe Line Co., died December 17 at his home in Tulsa after a heart attack. Langenkamp retired in 1950.

Dexter D. Gise, 54, supervisor of maintenance in Texaco's Denver district, died December 1 in Hays, Kans. Gise had been with Texaco for 23 years.

Kenneth Daniels, 49, auxiliary engineer for Cities Service Petroleum Co. in Blackwell, Okla., died December 18 in Blackwell after a heart attack.

Leonard W. Orynski, 77, retired chief geologist for Standard Oil Co. of Texas, died December 19 in Dallas. He had done consulting work in Dallas since retiring in 1949 in Houston.

Jack Hemphill III, service engineer for Gray Tool Co., Houston, was killed December 20 in a helicopter crash in the Gulf of Mexico south of Leeville, La.

John Powell Bradley, Bowie, Tex., superintendent for Service Pipe Line Co.'s North Texas district, died December 17 in a Temple, Tex., hospital. Bradley had been with Service Pipe Line over 35 years.

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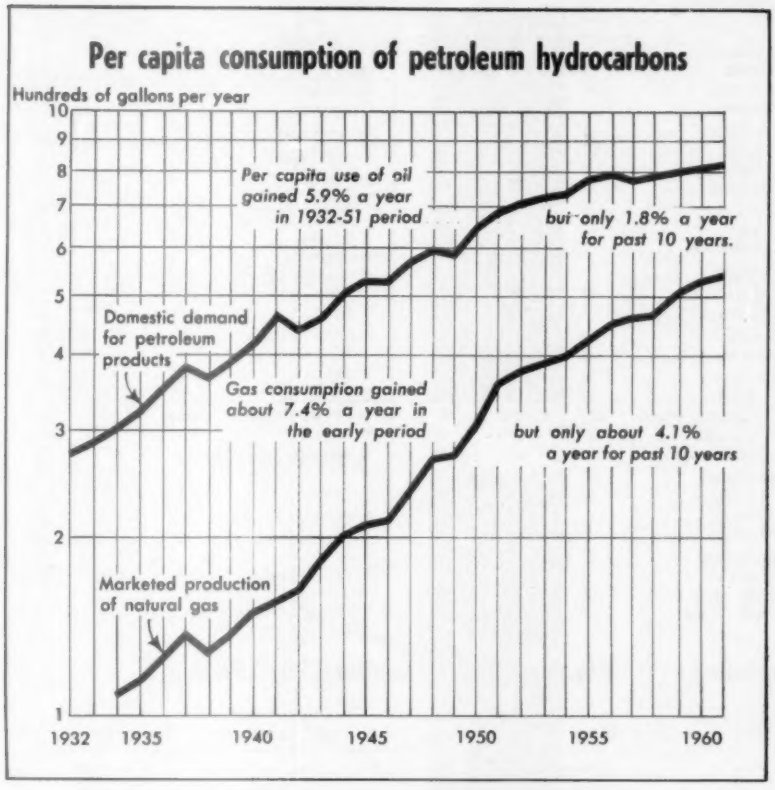


Per capita oil use still rising

Watch for increase in gain rate

BY JOHN C. CASPER

PER CAPITA consumption of petroleum products is still rising despite the general slowdown that started in the early fifties. To get proof of this fact, just divide total consumption of petroleum products this year by total population and compare the result with similar figures for other years.

Lines on the above chart show changes in per capita consumption of petroleum products and natural gas since the depression days in the thirties. Graphs are plotted on semilog paper to show fairly long periods with near-constant percentage gains.

For the years 1932-51, per capita consumption of petroleum products gained at the rate of almost 6% a year. There were year-to-year variations, but the points do not stray very far from a straight line.

The picture changed about 1951. The line still follows a near-constant trend, but the gain rate dropped to about 1.8% a year.

The lower line gives similar information about consumption of natural gas. Per capita use of gas increased about 7.4% a year in the early period and dropped to 4.1% a year in the fifties.

There is little chance that gains in use of oil and gas will return to the high rates of the thirties and forties, but there is high probability of some improvement before 1965.

The big postwar baby crop is just growing into the car-driver age. Our largest gain in car drivers and car owners will come in the middle sixties.

These potential gasoline users have been in the population totals for years. They soon will graduate to oil users and be counted in the numerator as well as the denominator of the per capita consumption ratio.

In the last half of this decade, this same group will grow into potential consumers of home-heating distillates and natural gas. Under the influence of these changes, the gain rate of 1.8% a year should move up over the balance of the decade.

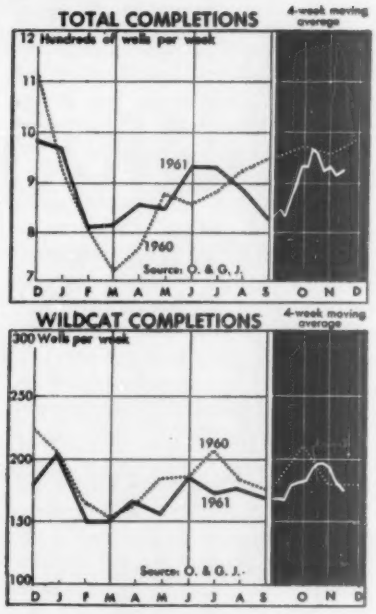
These shifts in demand will call for changes in processing over the next 10 years. Increases in gasoline demand over the next 5 years will call for higher yield of the product from a barrel of crude.

By the time the teenagers become homeowners, distillate should be able to hold its own in competition with gas for the heating market. Higher distillate yields at refineries may mean upgrading residual to distillate rather than distillate to gasoline.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,342,059	DOWN	37,576	UP	190,400
Crude stocks	246,684,000	DOWN	1,506,000	UP	7,415,000
Completions	998	UP	122	UP	17
Refinery runs	8,276,000	DOWN	15,000	UP	349,000
Gasoline stocks	188,833,000	UP	1,367,000	DOWN	1,126,000
Kerosine stocks	34,687,000	DOWN	397,000	UP	84,000
Distillate stocks	162,815,000	DOWN	6,303,000	UP	3,281,000
Residual stocks	46,923,000	DOWN	601,000	DOWN	1,709,000
Four-product stocks	433,258,000	DOWN	5,934,000	UP	530,000
Total imports	1,697,000	DOWN	286,000	UP	197,900

Drilling



Active rotary rigs*

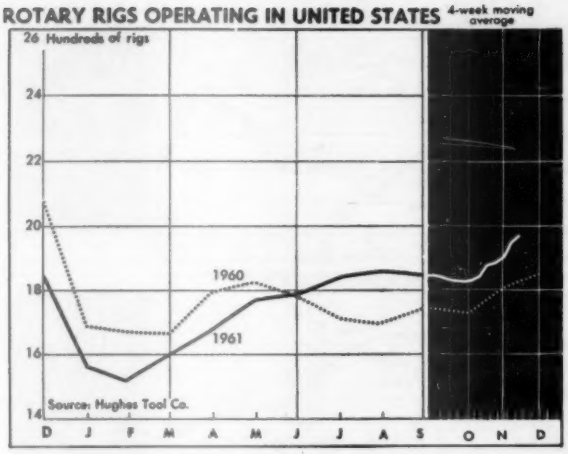
	12-18-61	12-11-61	12-19-60
Alabama	7	8	6
Alaska	9	8	7
Arkansas	16	18	9
Arizona	..	..	1
California	117	116	82
Land	112	112	79
Offshore	5	4	3
Colorado	32	28	26
Florida	1	1	4
Land	..	..	2
Offshore	1	1	2
Georgia	..	..	2
Illinois	47	46	43
Indiana	3	5	13
Kansas	143	137	130
Kentucky	3	4	5
Louisiana	296	293	272
North	32	34	31
S. inland waters	107	107	97
S. Land	97	89	96
Offshore	60	63	48
Michigan	27	27	31
Mississippi	67	70	60
Missouri	..	..	2
Montana	33	32	32
Nebraska	27	30	22
Nevada	1	1	1
New Mexico	109	112	98
New York	3	3	2
North Dakota	15	14	17
Ohio	8	8	5
Oklahoma	225	232	201
Oregon	..	..	1
Pennsylvania	12	12	13
South Dakota	1	..	..
Tennessee	..	..	1
Texas	684	707	666
S. inland waters	10	14	9
S. land	185	192	176
Offshore	3	3	2
North	59	64	63
Panhandle	63	61	54
East	54	67	48
West Central	170	171	151
West	140	135	127
Utah	36	40	31
Washington	1	1	1
West Virginia	16	16	6
Wisconsin	..	..	1
Wyoming	69	67	73
Total U. S.	2,008	2,036	1,828
Cum. avg. to date	1,757	1,752	1,745
Western Canada	184	167	182
Grand total	2,192	2,203	2,010

*Hughes Tool Co. report.

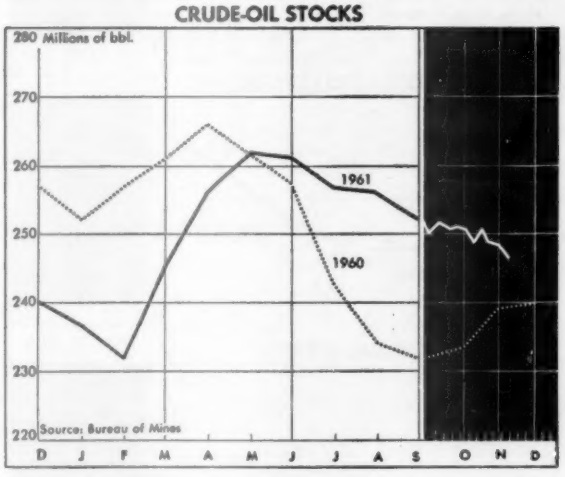
Weekly well completions . . . Week ended December 16, 1961

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	5	2	0	0	3	0	11,567	508	596	2	0	0	0	2	104	144
California	62	46	0	5	11	0	167,120	1,847	1,679	4	0	0	1	3	264	297
Colorado	13	2	0	1	10	0	69,355	638	662	5	0	0	0	5	285	330
Illinois	182	22	0	0	14	146	446,139	2,116	2,277	8	1	0	0	7	459	478
Indiana	13	9	0	0	4	0	25,209	765	1,022	3	2	0	0	1	205	356
Kansas	64	25	0	1	37	1	226,091	4,527	4,011	16	0	0	0	16	841	1,014
Kentucky	17	6	0	0	11	0	18,805	1,687	2,084	1	0	0	0	1	122	217
Louisiana	51	12	1	4	34	0	342,562	3,790	3,588	9	0	0	0	9	653	538
North	28	9	1	4	14	0	121,624	1,641	1,421	4	0	0	0	4	327	262
South	19	1	0	0	18	0	185,071	1,636	1,688	5	0	0	0	5	274	242
Offshore	4	2	0	0	2	0	35,867	513	479	0	0	0	0	0	52	34
Michigan	13	4	0	3	6	0	33,087	788	908	4	0	0	1	3	288	251
Mississippi	15	3	2	0	10	0	138,612	549	663	3	0	1	0	2	193	259
Montana	6	4	0	0	2	0	29,018	382	333	1	0	0	0	1	176	158
Nebraska	25	3	0	0	22	0	115,131	950	848	17	0	0	0	17	480	367
New Mexico	41	21	0	12	7	1	213,087	1,756	1,800	6	2	0	2	2	283	248
West	13	2	0	11	0	0	73,965	756	657	1	0	0	1	0	93	69
East	28	19	0	1	7	1	139,122	1,000	1,143	5	2	0	1	2	190	179
North Dakota	7	7	0	0	0	0	43,361	248	275	0	0	0	0	0	69	80
Ohio	24	10	0	2	12	0	66,985	1,036	1,058	5	1	0	0	4	46	52
Oklahoma	123	71	2	5	31	14	494,125	5,511	4,592	12	4	0	0	8	502	685
Texas	282	161	0	24	95	2	1,176,030	13,884	15,045	61	3	0	6	52	2,995	3,080
Dist. 1	21	16	0	0	5	0	48,538	894	1,078	7	2	0	0	5	345	378
Dist. 2	22	4	0	7	11	0	148,810	741	734	8	0	0	1	7	230	180
Dist. 3	25	12	0	3	10	0	119,075	1,130	1,135	5	0	0	0	5	237	218
Dist. 4	23	6	0	4	13	0	135,838	1,155	1,032	12	1	0	3	8	336	286
East	27	21	0	1	5	0	126,878	1,108	1,258	2	0	0	0	2	282	258
Dist. 7-B	28	10	0	2	16	0	86,723	1,691	2,151	12	0	0	1	11	477	612
West	62	45	0	2	14	1	310,338	3,484	3,849	11	0	0	0	11	686	618
Dist. 9	60	38	0	2	19	1	142,926	2,580	2,814	3	0	0	0	3	280	475
Dist. 10	14	9	0	3	2	0	56,904	1,101	994	1	0	0	1	0	122	55
Utah	10	1	0	4	5	0	50,203	235	235	4	0	0	0	4	107	92
West Virginia	22	0	0	20	2	0	48,210	1,019	836	0	0	0	0	0	7	10
Wyoming	22	6	0	2	14	0	126,141	952	1,036	10	0	0	0	10	368	416
Misc. (S. D.)	1	0	0	0	1	0	5,706	1,322	1,404	1	0	0	0	1	253	244
Total U. S.	998	415	5	83	331	164	3,846,544	44,510	44,952	172	13	1	10	148	8,700	9,316
Previous week	876	385	1	103	320	67	3,572,211	.....	.....	175	18	0	5	152	.....	.....
Cum. 1961	44,510	19,959	732	4,627	16,175	3,017	181,941,088	.....	.....	8,700	778	83	382	7,457	.....	.....
Cum. 1960	44,952	20,314	1,277	3,837	16,930	2,594	184,383,627	.....	.....	9,316	832	110	319	8,055	.....	.....
Western Canada	72	48	0	11	13	0	381,173	2,282	2,220	23	6	0	5	12	527	571

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



Crude-oil stocks by states of origin*

(Thousands of barrels)

	12-9-61	12-2-61	12-10-60
Pennsylvania	2,310	2,323	2,308
Other Appalachian	1,399	1,406	1,331
Illinois, Indiana, Michigan	10,029	9,855	8,631
Nebraska and North Dakota	3,449	3,412	2,704
Kansas	9,246	9,467	8,959
Oklahoma	17,442	17,130	14,933
Arkansas	1,803	1,981	1,825
Louisiana	21,599	21,372	19,701
North	3,447	3,261	3,125
South	18,152	18,111	16,576
Mississippi, Alabama, Florida	3,674	3,662	1,916
New Mexico	10,757	10,802	8,434
Texas	102,613	103,548	100,478
East Texas	8,567	8,278	7,595
West Texas	46,031	46,075	47,147
Texas Gulf	18,005	18,172	17,862
Other Texas	30,010	31,023	27,874
Wyoming	16,018	15,972	16,789
Other Rocky Mountain	9,619	9,638	10,240
California	23,188	23,372	26,428
Foreign	†13,538	14,250	14,592
Total	**246,684**	248,190	239,269

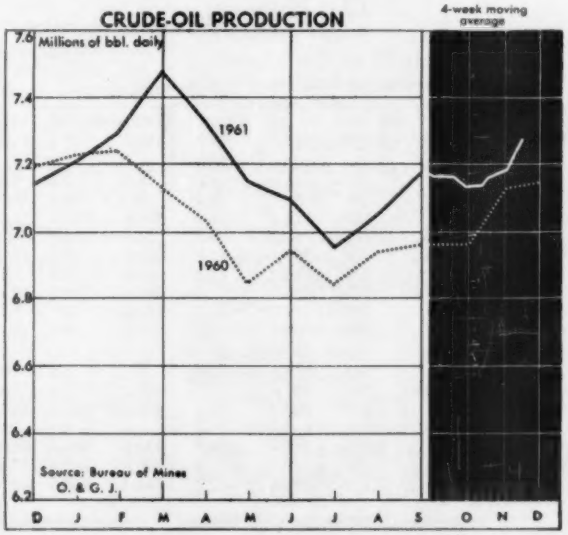
*Bureau of Mines. †Includes 3,748,000 bbl. in California.

Daily average production for week

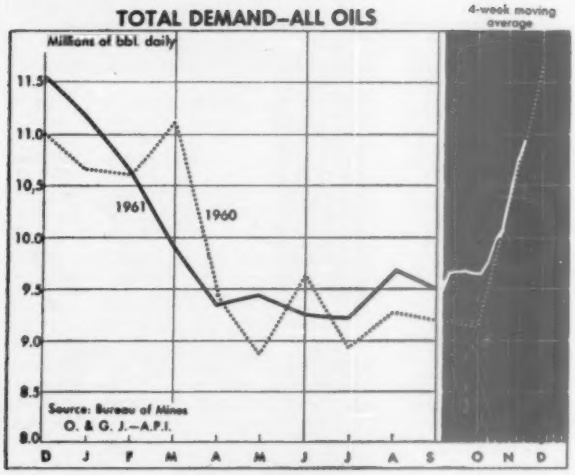
	December 16, 1961 Crude oil	Lease condensate	Total	Dec. 9 total
Alabama	18,725	.....	18,725	18,725
Alaska	27,000	.....	27,000	26,600
Arkansas	79,400	.....	79,400	79,600
California	816,000	.....	816,000	816,500
Colorado	124,000	.....	124,000	125,300
Eastern	41,200	.....	41,200	42,000
Florida	1,000	.....	1,000	1,000
Illinois	215,300	.....	215,300	226,400
Indiana	31,100	.....	31,100	30,700
Kansas	†310,164	.....	†310,164	†310,440
Kentucky	49,500	.....	49,500	49,500
Louisiana	1,051,000	166,500	1,217,500	1,217,500
North	113,000	16,500	129,500	129,500
South	938,000	150,000	1,088,000	1,088,000
Michigan	52,700	.....	52,700	52,600
Mississippi	147,000	4,300	151,300	151,300
Montana	90,400	.....	90,400	91,500
Nebraska	71,000	.....	71,000	70,400
Nevada	450	.....	450	450
New Mexico	303,000	9,000	312,000	312,000
North Dakota	60,200	.....	60,200	61,500
Oklahoma	†523,800	.....	†523,800	†546,250
Texas	2,540,000	102,670	2,642,670	2,642,670
Dist. 1	41,000	3,500	44,500	44,500
Dist. 2	110,000	8,800	118,800	118,800
Dist. 3	312,000	40,600	352,600	352,600
Dist. 4	185,000	14,000	199,000	199,000
Dist. 5	27,000	1,000	28,000	28,000
Dist. 6	124,000	9,400	133,400	133,400
East Texas field	136,000	.....	136,000	136,000
Dist. 7-B	120,000	700	120,700	120,700
Dist. 7-C	114,000	4,070	118,070	118,070
Dist. 8	1,070,000	13,000	1,083,000	1,083,000
Dist. 9	196,000	5,000	201,000	201,000
Dist. 10	105,000	2,600	107,600	107,600
Utah	87,300	.....	87,300	91,100
Wyoming	418,600	.....	418,600	414,800
Others	‡750	.....	‡750	‡800
Total U. S.	7,063,589	282,470	**7,342,059**	7,379,635
Change from prev. week, down			**32,576**	
Canada	†699,000	†8,000	†707,000	†608,300
Total U. S. Prod.—Jan. 1-Dec. 16			2,513,652,400 bbl.	
Same period last year (crude plus cond.)			*2,467,358,800 bbl.	

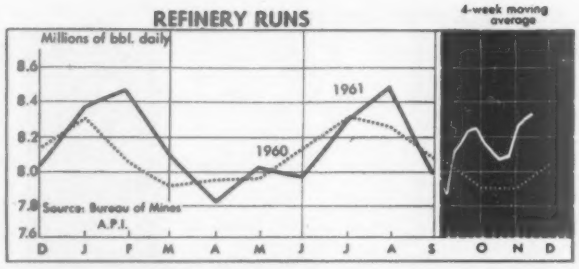
*Includes 79,557,400 bbl. condensate. †Week ended previous Monday. ‡South Dakota, Arizona, Missouri.

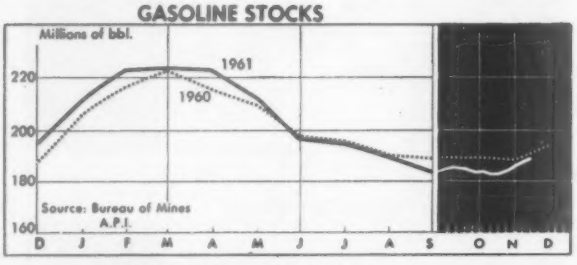
CRUDE-OIL PRODUCTION

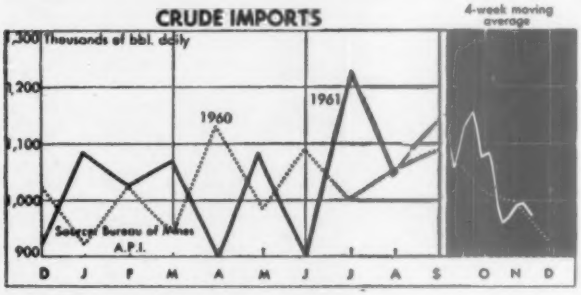


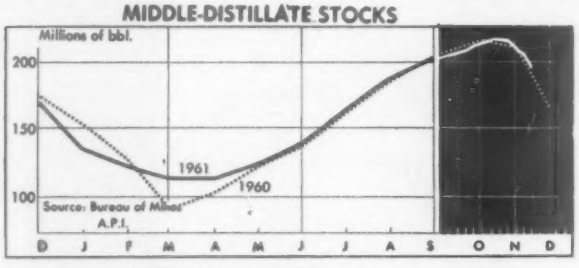
Refining

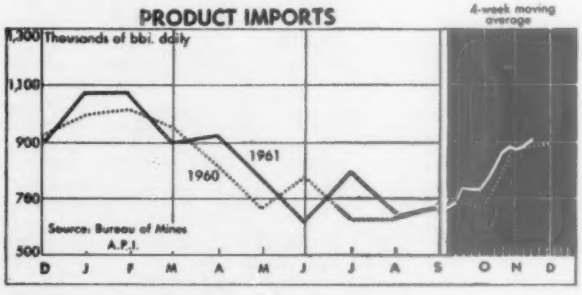

TOTAL DEMAND—ALL OILS
4-week moving average
Millions of bbl. daily
1961
1960
Source: Bureau of Mines
O. & G. J.—A.P.I.
D J F M A M J J A S O N D

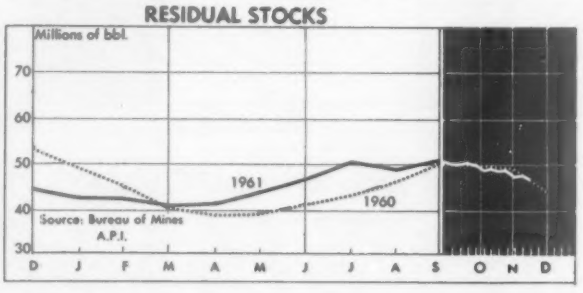












API refinery report—December 15, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,210	544.4	49.0	361.0	165.8	43,560	14,270	65,272	13,568	1,074.6	498.4	37.1	330.9	164.7
Appalachian:														
District 1	113	48.3	4.4	28.0	7.4	5,588	681	4,168	443	105.8	43.5	4.5	26.5	14.6
District 2	99	50.7	8.6	19.1	10.9	3,164	442	1,784	225	100.0	51.0	7.1	19.1	14.1
Ind., Ill., Ky.	1,563	818.3	85.6	306.6	203.0	32,033	6,666	26,637	5,658	1,486.6	751.9	82.0	327.1	202.7
Minn., Wis., Dak.	127	63.2	9.0	24.9	16.7	6,771	1,778	7,753	526	128.0	60.9	6.8	28.8	22.5
Okla., Kans., Mo.	726	387.4	21.8	180.0	15.7	17,026	1,620	13,093	933	735.4	426.3	18.1	192.8	25.1
Inland Texas	294	194.0	11.3	45.6	14.3	7,123	647	1,503	2,773	284.6	220.2	9.8	45.5	19.9
Texas Gulf Coast	1,757	1,005.3	117.4	500.1	129.6	24,779	3,353	15,507	4,718	1,883.2	996.9	151.1	511.9	158.0
La. Gulf Coast	746	379.7	61.7	160.9	31.7	9,954	1,655	7,354	1,346	629.3	359.7	68.7	129.1	46.9
N. La. and Ark.	112	66.7	5.3	24.1	6.6	6,110	785	3,042	205	110.0	67.4	4.0	23.8	7.7
Rocky Mountain:														
New Mexico	15	9.4	0.6	1.3	1.6	738	42	178	90	23.9	12.7	0.5	4.1	2.7
Other Rocky Mt.	296	137.6	7.7	67.1	32.0	5,477	495	2,364	999	274.8	140.3	4.2	64.6	34.9
West Coast	1,218	600.7	46.3	254.9	328.1	26,510	2,253	14,160	15,439	1,193.7	553.1	37.6	205.6	281.8
Dec. 15, 1961	8,276	4,305.7	428.7	1,973.6	963.4	188,833	34,687	162,815	46,923	8,029.9	4,182.3	431.5	1,909.8	995.6
Dec. 8, 1961	8,291	4,252.3	433.0	2,105.0	895.0	187,466	35,084	169,118	47,524	.....	.....	.....	.....	.....
Dec. 16, 1960	7,927	4,086.0	422.3	1,846.3	949.1	189,959	34,603	159,534	48,632	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES

Gravity schedule

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver-Julesburg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	†$2.35	$2.61	$2.29	$2.95	$2.90	‡$2.38	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.40	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.42	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.44	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.46	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.48	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.50	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.52	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.54	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.56	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.58	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.60	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.62	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.64	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.66	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.68	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.70	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.72	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.74	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.76	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.78	2.95

*Cooke, Grayson, Montague. †Other posting starts at $2.55. ‡Some at 2.58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.10-3.25
Conroe	3.23-3.53
Van	2.93-3.08
Pennsylvania Grade:	
Bradford	$4.63- 4.80
Middle District	4.35- 4.52
Southwest Pennsylvania	4.08- 4.25
West Virginia	4.00- 4.17
Buckeye Grade	3.91- 4.08
Illinois Basin	**3.00**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34,9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	1.72
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41°-41.9°, Umm said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.63
Redwater (Alta.)	2.52
Weyburn (light)	2.185
Midale C	1.89
Venezuela:	
Cumarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Price for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long ton)

Latest reported spot fixtures)

Gulf-NY, clean (ATRS+12.5%)	$3.21
Gulf-NY, dirty (ATRS+5%)	2.99
Carib-NY, dirty (ATRS—52.5%)	1.31
Carib.-UK, dirty (Scale—55%) (14s. 7d.)	2.04
Sidon-NY, dirty (ATRS—70%)	2.34

★Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refinenrs' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (91 octane)	11.25-11.50
Premium (99 octane)	14.00-14.25
†Natural gasoline (26-70)	4.5
†Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-11.00
Regular (92 octane)	10.75-11.25
Premium (98 octane)	11.75-12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.20
Premium (94 octane)	12.20
Premium (100 octane)	13.35
Caribbean area (cargoes):	
Regular (87 octane)	9.00
Premium (97 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.00-10.25
Diesel oil (58 d.i. and above)	9.50- 9.75
Distillate No. 1	9.50- 9.75
Distillate No. 2	8.75- 9.00
Gulf Coast (cargoes):	
Kerosine 41-43	10.00
Distillate No. 2	9.00
New York Harbor (barges):	
Kerosine 42-43	11.70
Distillate No. 2	10.70
Diesel fuel, 48-52 d.i.	10.85
Caribbean area (cargoes):	
Distillate No. 2	8.10

RESIDUAL FUEL

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.70- 1.80
Gulf Coast (cargoes):	
Bunker C fuel	2.20
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C fuel	2.00
California (rack):	
Bunker C fuel, Los Angeles	2.25

†Due to the decline in market for Grade 26-70 natural gasoline, The Oil and Gas Journal will discontinue publication of prices for this grade of natural gasoline at the end of 1961.

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:

- **UNDISPLAYED CLASSIFIED:** 30c a word per issue. 10% discount for three or more consecutive issues. $5.00 minimum charge. Blind box in care count nine extra words. Not subject agency commission.
- **DISPLAYED CLASSIFIED:** $20 a column inch one issue, 10% discount three or more consecutive issues. Minimum size one inch. Subject to agency commission.
- All classified payable in advance.

- DEADLINE: Copy to reach The Oil and Gas Journal not later than 9 a. m. on Wednesday preceding date of publication. Send advertisements to: Classified Advertising Manager, THE OIL AND GAS JOURNAL, P. O. Box 1260, Tulsa 1, Oklahoma.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona). Write: Classified Departments, Inc. The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0287. Copy deadline Monday noon.

FOR SALE EQUIPMENT

20,000 FEET 4½" O.D. used 10.79# double random pipe, PE and beveled for welding, tested 1000#, priced reasonable. Call CE 5-1454, Oklahoma City, collect.

AN INVESTMENT! Productive advertising is an investment rather than an expenditure. Experienced oil men have found that The Oil and Gas Journal is their best classified advertising medium.

CAMCO GAS LIFTS and Differential Valves, complete with valves, latches, mandrels and controllers. 50% or less of acquisition cost. Bachus Oil Company, 721 E. Central, Wichita 2, Kansas. AM 5-9531.

FRANKS 2000 trailer mounted drill, GMC Diesel, 1958 IHC twin screw tractor, KB8 tractor, Chevy winch truck, 2 tandem trailers, 4,000 ft. 2⅞ drill tubing, 300 ft. collars, dog house, light plant, etc.—$32,000.00. Sell separately. M. H. Collum, 2011 Glenarm, Denver, Colorado, KE4-0253.

GAS PROCESSING Equipment: New 4 MM SCFD Glycol Dehydrator, 1200# W.P., $2550.00. Used 6 MM SCFD Glycol Dehydrator, 1000# W.P., $3750.00 Used 10 MM SCFD Glycol Dehydrator, 1000# W.P., $5000.00 Used National 1 MM Dry Dessicant Dehydrator, 1000# W.P., $6500.00. Used BS&B 300 Bbl/Day Stabilizer, 500# W.P., 500,00 BTU/Hr. Salt Bath Reboiler and Product Cooler, complete, $7500.00. Engineered Specialties Co., P. O. Box 35683, Phone FL 1-5284, Dallas 35, Texas.

50,000'—16" OD Used, ⅜" Wall
Good No. 2 Pipe, Lapweld, SRL
@ $.....
30,000'—3½" OD Used, Seamless 5#,
No. 1 Line Pipe, P.E. @ $.....
Prompt Shipment From Stock
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Columbus Steel Supply Company
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Columbus 3, Ohio AX 4-4461

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MOST EQUIPMENT NEW 1956

TOWERS • COMPRESSORS
DRUMS • BLOWERS
FURNACES • TRANSFORMERS
PUMPS • MOTORS
CONDENSERS • FURNACE TUBES

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HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.

FOR SALE EQUIPMENT

FOR SALE—Compressor Cylinders. 4—Ingersoll Rand 26" & 26" x 14" 62KVG—1, Price $2000.00 each. 5 Heat exchangers 20' 5" Overall Length 51" diameter, 284—1½" OD steel tubes. Shell working pressure 240# test 412#. Tubes working pressure 175# test 350#; Price $3000.00 each. All types refinery equipment and valves. Contact: P. E. Pendergrass, Box 761, Billings, Montana; Phone 252-6327 or 245-5689.

FOR SALE: Two U-15s, excellent condition, complete in every detail. Inventory and price on request. Box M-661, The Oil & Gas Journal, Tulsa, Oklahoma.

AT N. LITTLE ROCK, ARKANSAS

3—Worthington #L T C-4, compressors, 3500 CFM @ 45 PSI, 24 x 15, 2-cyl., 500 HP, 4-cycle, gas-engine drive.

Phone POplar 3-3505

PERRY EQUIPMENT CORP.
1402 N. Sixth St.
Philadelphia 22, Pa.

USED EXPLORATORY RIG, COMPLETE

GA-500-EMSCO 6,000 ft. plus capacity; Moore 126' mast, 9' substructure; 16" G-D pump; 2-LRT-6-1 Cummins Diesels; approx. 5,000 ft. 4½" drill string.

A MOST COMPLETE exploratory rig. All accessories, many extras; winterized; no additions needed, start drilling.

LOCATION: Near Craig, Colo.

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- **HOIST UNITS**
  NEW AND USED
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Box 1936, Fort Worth, Texas
FOREIGN AND DOMESTIC SALES

FOR SALE EQUIPMENT

29,000' #1 USED 13" OD LW casing. Furnish PE or T&C. Lundquist Pipe and Supply, 325 Wright Building, LU 5-8850, Tulsa, Oklahoma.

APPROX. 8000'—3½" OD 13.30# CS Hydril seamless Flush Joint Pipe in excellent condition. Call H. & H. Supply Company—OR 7-2418—Box 4173, Oklahoma City 9, Oklahoma.

50,000 FT. 20 inch No. 1 grade used pipe. Lengths 20 ft. square cut ends. Weight 78# to the ft. High Tensile Pipe. Indiana-Ohio Pipe Co., P. O. Box 5462 Shep Sta., Columbus 19, Ohio. Phone CL 3-5527—CL 3-5528.

SIE, 24 TRACE, dual record, GA7-G Seismic system complete. Mounted on 1958, 2 ton Chevrolet truck, front end winch. Other equipment also available. Texas Seismograph Co. Box 2069, Phone 723-1493, Wichita Falls, Texas.

EQUIPMENT WANTED

DRILL COLLARS. Specs.; 5.5" OD, 2.5 ID, 27' to 30' long, 3.5" IF thread. Will take up to 50 if priced right. Mesker Drilling Company, Box 7465, Tulsa, Okla.

WANTED: One truck mounted dewaxing unit complete with 3C Kobe, 50-barrel round tank, Butane fired heater. State truck model, condition and price. Paraffin Service, Inc., c/o Stan Brown, P. O. Box 3215, Ventura, Calif., Phone MI 3-9926.

HELP WANTED

RESERVOIR ENGINEER—Must have experience in reservoir analysis, evaluation, secondary recovery, and unitization. Excellent opportunity for energetic resourceful man in growing organization. Location in Dallas. Salary commensurate with experience. Please send resume to Hunt Oil Company, 700 Mercantile Bank Building, Dallas 1, Texas; attention Personnel Department.

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Send complete resume including salary requirements to:

Box M-666
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

PHOTOGEOLOGIST—Balplex Operator—Major oil company has opening in Denver. Send resume of experience and salary expected to Box M-669, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION COMPANY active in Appalachians will train young college graduate for career in oil business as landman. Send full particulars: Joe Jamar, 507 Commonwealth Bank Bldg., Butler, Pa.

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WANTED: Petroleum or Mechanical Engineer for oil tool design. Experience with the operation of downhole equipment is desirable. State age, education, experience and salary expected. Box M-643, The Oil and Gas Journal, Tulsa, Oklahoma.

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Graduate Electrical and Civil Engineers with 5 to 8 years' experience in detail design of pipeline and plant facilities. Continued growth and diversification of this major company requires supervisory potential. Permanent position with excellent salary and benefits. Pleasant friendly city with good schools and housing. All qualified applicants will be considered regardless of race, color creed or national origin. Submit resume with complete salary history to: J. Alan Hansen, Northern Natural Gas Company, P. O. Box 308, Omaha, Nebraska.

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LINE PIPE

One of country's largest line pipe and casing pipe manufacturers needs general sales manager to direct sale of its product to the petroleum and gas industry. Must be 40-45 years of age; have outstanding record in selling pipe or related products to the oil and gas industry; be a graduate engineer; and have the ability to staff, direct, and manage an extensive field sales organization.

Will report to executive officer of the company and will be held fully accountable for sales results. We want a name man in the industry.

Box M-674, The Oil and Gas Journal
Tulsa, Oklahoma.

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Box M-673, The Oil and Gas Journal
Tulsa, Oklahoma

SITUATIONS WANTED

GEOLOGIST, M.S., 10 years experience in exploration and development that includes drilling, completions, reservoir studies and water-flooding. Permian Basin and Tri State Areas. Desires position with future. Box M-675, The Oil and Gas Journal, Tulsa, Oklahoma.

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CALIFORNIA Oil and Gas drilling blocks, mergers and acquisitions, joint ventures, buyers and sellers of oil and gas properties, contract land work, appraisals and geological evaluations. George Malekos, Registered and Bonded, P. O. Box 722, San Francisco, Calif.

PRODUCTION WANTED

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WANT TO BUY—Leases, minerals and royalty. Please state terms in first letter, including legal descriptions. Box M-672, The Oil and Gas Journal, Tulsa, Oklahoma.

ARIZONA—Big "Helium" lease play. Leases Available near Majors $1.00 acre. Terms—Free Maps. Edward Colson, 1716 W. Devonshire, Phoenix, Arizona.

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FOR SALE: Secondary recovery prospect, Washington County, Okla. 170 acres in Sections 12 and 13, T.27N., R.13E. Bartlesville Sand. Approx. 1,300' T. D. Ten to 30' of sand. Desire responsible Company experienced in water flooding. Frank Small Oil Co., 3420 Wayside Drive, Bartlesville, Okla.

NEBRASKA LEASES for sale. Fee Land, 10 year leases 25 cents rentals Active area. P. O. Box 1642, Lincoln, Nebraska.

315 ACRE LEASE

Wilson County, Kansas. Two sands, 950' and 1050', both floodable. Core analysis available.

Four leases, Crawford County, Kansas, under partial flood. Bartlesville sand being flooded at 350'. Burgess sand at 490', never produced. Core analysis available. Included: cable tool rig, Franks pulling unit, GMC pickup, 59 Ranchero. Everything goes for $80,000. Brokers Invited.

Box M-677, The Oil and Gas Journal

LEGAL NOTICE

SEALED BIDS WILL be recevied until 10:00 A.M., Mountain Standard Time, January 18, 1962, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for oil and gas leases on 217 tracts of allotted lands totaling approximately 35,448.16 acres, located in Sandoval, McKinley and San Juan Counties, New Mexico with one tract in San Juan County, Utah. Details of the lease offering and filing of bids may be obtained by addressing an inquiry to the General Superintendent, Navajo Agency, Attention: Branch of Realty, Window Rock, Arizona.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Cheyenne, Wyoming. Notice is hereby given that one parcel of land totaling 151.27 acres, within the known geologic structure of the Medway field undefined, Hamilton County, Kansas, and eight parcels of land totaling 2,793.69 acres within the known geologic structures of the East Mahoney and West Ferris fields, Carbon County, Wyoming, are offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 2:00 P.M., MST, February 7, 1962, when bids will be opened. Details of the offering, and how and where to submit bids, may be obtained from the Land Office, Cheyenne, Wyoming. Arvin H. Olswold, Chief, Minerals Section.

LEGAL

THE FOLLOWING announcement is made by virtue of the powers vested in the Ministry of Finance by Order No. 1 of 1943, as amended. 1. The areas situated within the boundaries of District 1 and District 2 as described below are declared as "open" for the submission of proposals for the award of petroleum concessions therein for a period of three (3) months from Dec. 5th, 1961 ("zero date"). 2. (a) Boundaries of District 1: Commencing at the intersection of latitude 16° North and longitude 41° 20' East; thence South along longitude 41° 20' East in a straight line to the intersection of latitude 14° 45' North and longitude 41° 20' East; thence West along latitude 14° 45' North to the intersection of latitude 14° 45' North and longitude 40° East; thence in a North-Westerly direction in a straight line to the intersection of latitude 15° 35' North and longitude 39° 15' East; thence in a North-North-Westerly Direction to the intersection of latitude 16° North and longitude 39° 05' East; thence East along latitude 16° North to the point of origin, the area enclosed in said boundaries being approximately 27,500 square kilometers in area. (b) Boundaries of District 2: Commencing at the intersection of latitude 18° 10' North and longitude 38° 45' East; thence in a South-South-Easterly direction to the intersection of latitude 17° 12' North and longitude 39° 14' East; thence East along latitude 17° 12' North to the intersection of latitude 17° 12' North and longitude 39° 41' East; thence South-East in a straight line to the intersection of latitude 16° North and longitude 41° 21' East; thence West along latitude 16° North to the intersection of latitude 16° North and longitude 39° 05' East; Thence North-North Westerly in a straight line to the intersection of latitude 17° 30' North and longitude 39° 40' East; Thence North-North-Westerly in a straight line to the border between the Empire of Ethiopia and Republic of Sudan; thence along said border to the coast of the Red Sea; thence in a North-Easterly direction in a straight line to the point of origin, the area enclosed in said boundaries being approximately 27,000 square kilometers in area. 3. Any company ("applicant company") desiring to submit a proposal or proposals looking to the award of a concession covering either or both of the Districts described above shall notify the Ministry of Mines in writing. Upon said notification, and against payment of U. S. $1,000 for each District with respect to which requested, the applicant company shall be furnished with all documents required to permit the preparation of a proposal including a form of Contract of Concession, and instructions relating to the procedure to be followed in submitting proposals, and other documents. In addition, information as to exploration activities already carried on within each such District shall be made available to the applicant company. 4. Prior to ("zero date plus three months") proposals may be filed by the applicant company in accordance with the prescribed procedure. All proposals filed before (above date) shall be deemed to be filed simultaneously but shall not, however, create or vest any right in the applicant company, the Imperial Ethiopian Government reserving full right to reject any and all proposals received without cause. 5. All proposals shall be opened in public on ("zero date plus three months and one day"). Address: Ministry of Mines, P. O. Box 486, Addis Ababa, Ethiopia. Ministry of Mines, Imperial Ethiopian Government.

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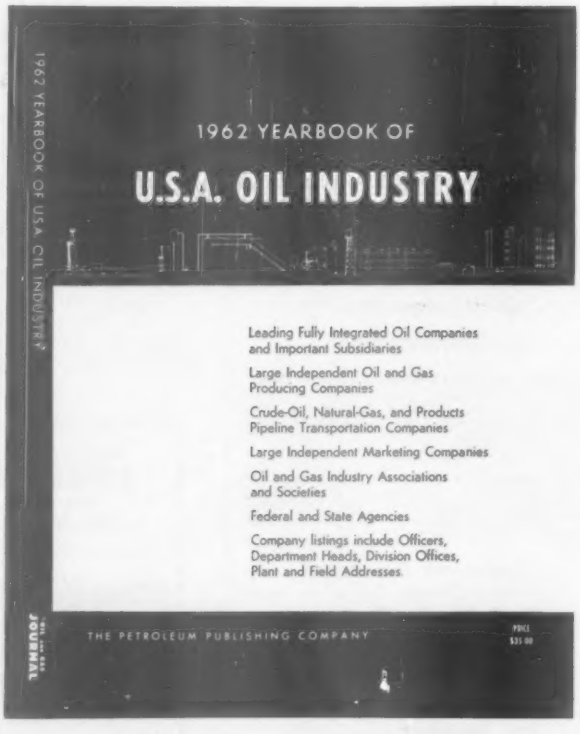
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Federal and State Agencies
Company listings include Officers, Department Heads, Division Offices, Plant and Field Addresses.
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ADVERTISERS IN THIS ISSUE

A

Air France Cargo 228
Ajax Iron Works 14
American Meter Company 203
Ammann, Inc., Jack 197
Aquaness Department, Atlas Powder Company 202, 203
Avondale Shipyards, Inc. 47

B

B & W Incorporated 72, 73
Baash-Ross Division of Joy Manufacturing Company 23
Baker Oil Tools, Inc. 78
Bank of Montreal 80
Baroid Division, National Lead Co. 19
Barton Instrument Corporation 75
Bethlehem Steel Company 175
Supply Division 15
Black, Sivalls & Bryson, Inc. 199
British Petroleum Company Limited, The 179
Burden Const. Corp., O. R. 192

C

Cameron Iron Works, Inc. 223
Chicago Bridge & Iron Company 65
Chiksan Company 32
Christensen Diamond Products 18
City of Calgary 160
City of Edmonton 218
Classified Advertising 244, 245, 246
Compagnie Generale de Geophysique 42
Comptoir Franco-Belge d'Exportation des Tubes d'Acier 22
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company 68, 69
Cooper, Inc., Fred E. 180
Core Laboratories, Inc. 232
Crouse-Hinds Company 67

D

Darling Valve and Mfg. Co. 39
Decca Navigator Co. Ltd., The 233
Denver U. S. National Bank 197
Diamond Chain Company 48
Dover Corporation, W. C. Norris Division 221
Dow Corning Corporation 196
Dowell 1, 208

F

First National Bank & Trust Co. of Tulsa 191
Fluid Packed Pump, Armco Steel Corporation 12
Fort Worth National Bank, The 222
Foxboro Company, The 13
Franks Division, Cabot Corporation, Machinery Division 52

G

Gaso Pump & Burner Mfg. Co. 169
General American Transportation Corporation 5
General Services Administration Utilization & Disposal Service Real Property Division 221
Geophysical Service, Inc. 215
Globe Oil Tools Co. 49
Go Perforator Supply, Inc. 225
Grant Oil Tool Company 51
Gray Tool Company 34
Grove Valve and Regulator Company 16, 17

H

Haering & Co., Inc., D. W. 187
Halliburton Company 3, 210
Hillman-Kelley 161
Hughes Tool Co. ..... Back Cover

I

Ideco, Division of Dresser Industries, Inc. 204
Ingersoll-Rand 56, 57

J

Jenkins Bros. 25
Jet-Lube Inc. 218
Johnston Testers, Inc. 156
Jones Company, The S. M. 206

K

Kellogg Co., The M. W. 26, 27
Koppers Company, Inc., Tar Products Division 21

L

Lane-Wells Company .. Inside Back Cover
LimiTorque Corporation 45
Litwin Engineering Company 189
Lone Star Steel Company 172, 173
Lufkin Foundry & Machine Co. 30

M

Magnet Cove Barium Corp. 55
Maloney-Crawford 71
Marsh Instrument Company, Division of Colorado Oil and Gas Corporation 28
Martin-Decker Corp. 197
McDonough Marine Service 192
Milwhite Mud Sales Company 63
Minneapolis-Honeywell Regulator Co., Industrial Division 198
Mission Mfg. Company 200

N

Nash Engineering Co. 41
National Airoil Burner Co., Inc. 53
National Tank Company 248
Nippon Kokan k.k. 44
Norris, W. C., Division, Dover Corporation 221

O

Oil Metering and Processing Equipment Corp. 174
Oil Well Supply Division 4

P

Parkersburg Division of Parkersburg-Aetna Corp. 185
Parsons Company, The Ralph M. 2
Peerless Pump, Hydrodynamics Division, Food Machinery & Chemical Corp. 43
Petroleum Distributing Company 196
Philadelphia Gear Corporation 45
Pittsburgh-Des Moines Steel Company 7
Pont-A-Mousson 35, 36, 37, 38
Price Company, H. C. 76

R

Reda Pump Company 220
Robbins & Myers, Inc. 186
Robin-Nodwell Mfg. Ltd. 184
Rockwell Manufacturing Company ..... Inside Front Cover
Rogers Geophysical Companies 74
Rolligon Corporation 196
Rotary Oil Tool Company 62

S

Schlumberger Well Surveying Corp 155
Shaffer Tool Works 207
Sikorsky Aircraft, Division of United Aircraft Corporation 40
Sinclair Oil Corporation 159
Smith Corporation, A. O., Meter & Service Station Equipment Division 60, 61
Southwestern Pipe, Inc. 29
Stone & Webster Engineering Corporation 33
Stone & Webster Securities Corporation 216

T

Taylor Instrument Companies ... 162, 163
Technical Oil Tool Corporation 219
Texas Instruments Incorporated 205
Thompson Pump Company 227
Thornhill-Craver Co. 8
Toronto-Dominion Bank, The 209
Torrington Company, The 182
Tretolite Company, A Division of Petrolite Corporation 10
Tube Turns Division of Chemetron Corporation 58, 59
Tuboscope Company 70

U

Union Carbide Chemicals Company, Division of Union Carbide Corporation 54
United States Steel Corporation ... 166, 167
Oil Well Supply Division 4
United States Treasury Dept. 238
Universal Atlas Cement Division 46

V

Vector Manufacturing Co., Inc. 206

W

Waukesha Motor Company 31, 50
Welex, A Division of Halliburton Company 230, 231
Well Equipment Mfg. Corp. 24
Western Geophysical Company 64
White Diesel Engine Division, The White Motor Company 6
Willys Motors, Inc. 229
Wilson Supply International Division 11
Wisconsin Motor Corporation 190
W-K-M Division of ACF Industries Incorporated 20
Woodward Governor Company 188

Y

Yuba Consolidated Industries, Inc. ... 9

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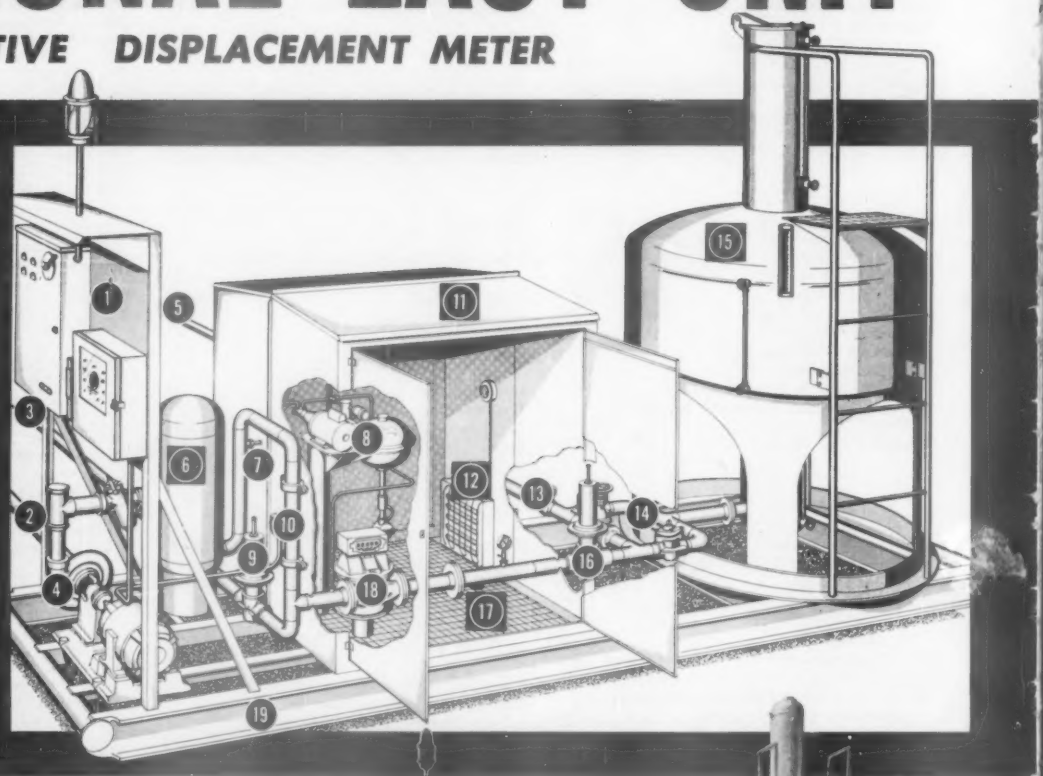

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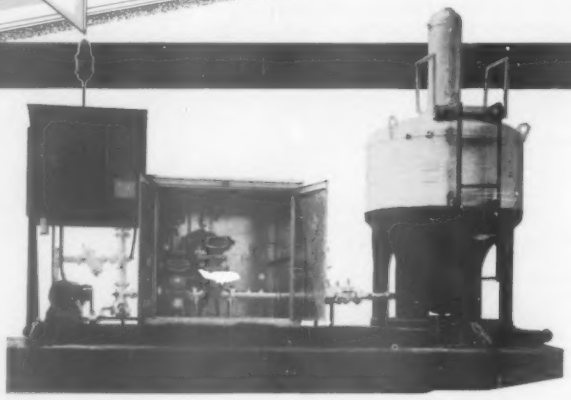

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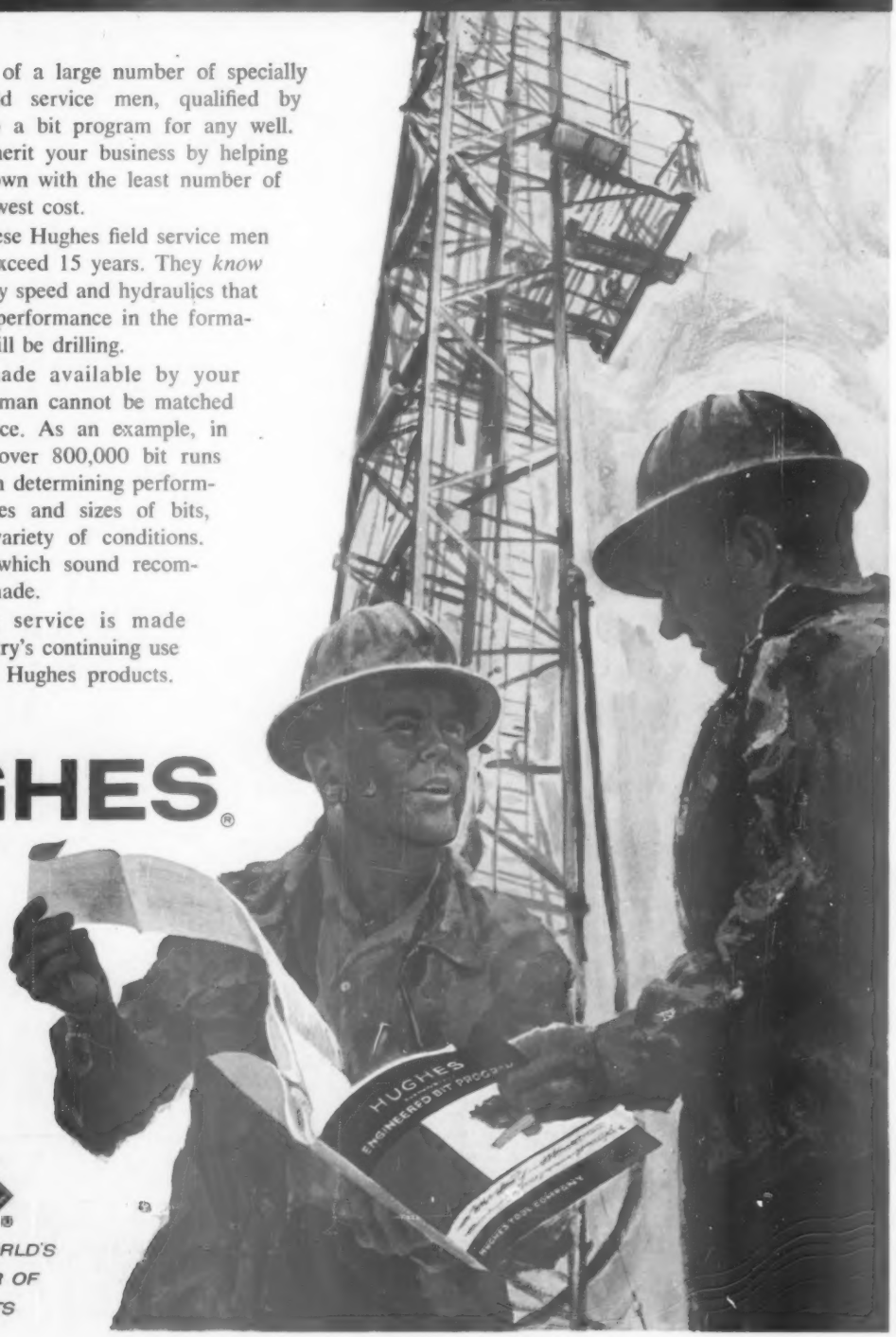

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